Working Paper

Department of Finance

Economic and Fiscal Policy Branch

Working papers are circulated in the language of preparation, to make analytic work undertaken by the staff available to a wider readership. They have received only limited evaluation and do not reflect the views of the Department of Finance. Comments on the working papers are invited and may be sent to the author(s).

THE PERSISTENCE OF LOW INCOME SPELLS IN CANADA, 1982-1993

Mireille Laroche*

Economic Studies and Policy Analysis Division

Working Paper 98-02

September 1997

---

* Special thanks to Joe Ruggeri and Tim Sargent of Finance and to Jean-François Beaumont, Jae Chung, Abdellatif Demnati, and Jan Patenaude of Statistics Canada. I would like to thank Carole Vincent, Ross Finnie, David Green, Steven James, Paul-Henri Lapointe, André Plourde, Linda Standish, Arndt Vermaeten, Myles Zyblock, and the participants of the LAD User Group for their comments on a previous version of this paper. The views expressed in this paper are solely those of the author. No responsibility for them should be attributed to the Department of Finance.

Abstract

This paper quantifies both the persistence of low income spells in Canada and the likelihood of exiting and re-entering a low income spell. It assesses multiple spells of low income and takes into account observable socio-demographic characteristics as well as unobserved heterogeneity in personal characteristics. We find that, regardless of the income measure used and of socio-demographic characteristics, the non-senior Canadian population can be roughly divided into two broad groups, more or less equal is size, where the first group is characterised by relatively short low income spells, reflecting a temporary situation, and where the second group experiences low income spells that are longer and more frequent, characterising a more permanent situation. Moreover, socio-demographic characteristics are important in determining the persistence of low income spells. Lone-parent families and non-family persons, especially women, are faced with relatively low (high) probabilities of exiting (re-entering) a low income spell and are more likely to spend extended periods of time below the low income threshold.

Résumé

Ce document quantifie la persistance des épisodes de faible revenu au Canada ainsi que la probabilité de sortir d'un épisode de faible revenu faible et d'y retourner en évaluant des épisodes multiples de faible revenu et en tenant compte des caractéristiques socio-démographiques observables ainsi que de l'hétérogénéité non observée des caractéristiques personnelles. Nous constatons que, quelle que soit la mesure du revenu utilisée et les caractéristiques socio-démographiques examinées, la population canadienne (en excluant les personnes âgées) peut être globalement divisée en deux groupes, plus ou moins égaux, le premier groupe étant caractérisé par des épisodes relativement courts de faible revenu, qui traduisent une situation temporaire, et le second groupe traversant des épisodes de faible revenu plus longs et plus fréquents, caractéristiques d'une situation plus durable. De plus, les caractéristiques socio-démographiques sont importantes lorsqu'il s'agit de déterminer la persistance des épisodes de faible revenu. Les familles monoparentales et les personnes hors famille, en particulier les femmes, font face à des probabilités relativement faibles (élevées) de sortir d'un épisode de faible revenu (de retomber dans un épisode de faible revenu) et sont plus susceptibles de passer de longues périodes au-dessous du seuil de faible revenu.

I. INTRODUCTION

The analysis of low income has traditionally been confined to incidence studies, that is, to assessments of the proportion of individuals or families whose income falls below a pre-defined threshold for any given year.[1] In recent years, the increased availability of microdata has allowed researchers to expand the scope of these studies and analyse the duration aspect of low income by focusing on low income spells. These analyses make extensive use of panel and longitudinal datasets to examine, among other things, the transition probabilities of exiting or entering a low income spell, given various socio-demographic characteristics.

Most studies on low income persistence have been confined to the United States. In Canada, there are no extensive studies on the duration of low income spells for the entire Canadian population. This paper fills this gap using Statistics Canada's Longitudinal Administrative Databank (LAD), which provides extensive information on income and various socio-demographic characteristics. This paper first examines the incidence of low income in Canada by presenting some descriptive statistics. It then quantifies the persistence of low income and the likelihood of exiting or re-entering a low income spell by assessing multiple spells of low income and by taking into account observable socio-demographic characteristics as well as unobserved heterogeneity in personal characteristics. This assessment of duration is a significant contribution to the study of low income in Canada, as it complements Statistics Canada's annual

[1] See, for example, Picot and Myles (1996), Zyblock (1996), Phipps (1995), Dooley (1994) and Sharif and Phipps (1994).

statistics on low income and can assist the development of efficient policy responses that take into account both dimensions of low income.

Section II of this paper summarises the relevant literature on the persistence of low income spells, while Section III discusses the data, the income concepts and the low income measure used in the analysis and provides some descriptive statistics. Section IV elaborates on the methodology used to assess low income persistence. Section V presents the estimation results and Section VI provides some concluding remarks.

II. LITERATURE REVIEW

Three approaches have typically been used to estimate the duration of low income spells: simple counts, the components-of-variance approach, and duration analysis.[2]

Simple Counts

The simple count approach simply tabulates the number of years individuals spent below a pre-defined low income threshold. Coe (1978) and Duncan *et al.* (1984) adopted this approach to assess the persistence of poverty in the United States, using data contained in the Panel Study of Income Dynamics (PSID). Laroche and Ruggeri (1996) analysed the persistence of low income

---

[2] This discussion is limited to the main approaches found in the literature. For an alternative approach to low income persistence, see, for example, Heath and Kiker (1992) who examine the determinants of low income spells for divorced women using a two-limit tobit model.

spells in Canada based on total family income using Statistics Canada's Longitudinal Administrative Databank (LAD). They found that, between 1982 and 1992, while more than 53 per cent of low income spells experienced by individuals ever present in LAD have been one-year spells, more than 26 per cent of all spells lasted at least three years. Moreover, over 40 per cent of all individuals present in LAD experienced at least one low income spell over the eleven year sample period.

This simple approach to the assessment of the duration of low income spells has numerous shortcomings. First, it does not allow for the impact of socio-demographic characteristics - such as sex, family type and education - upon the duration of low income spells. Second, it underestimates the persistence of low income, as it does not take into account the fact that some spells are censored either at the beginning and/or the end of the sample period.[3] Laroche and Ruggeri (1996) find that approximately 39 per cent of all low income spells contained in LAD are either censored at the beginning and/or the end of the sample period. The elimination of all censored spells would not only reduce the number of observations within the sample, but would also bias the results. Lastly, this approach does not provide any information on the events (for example, changes in marital status or in household income) which led individuals into or out of a low income spell.

---

[3] A spell is said to be censored if it begins (ends) at some unknown period before (after) the sampling period.

Components-of-Variance

The second estimation procedure uses a components-of-variance approach model to decompose the variations of earnings into permanent and transitory components. Within this approach, two types of models have been used. The first is the fixed effects model. In this model, the fixed (or permanent) effects, μ_i, are estimated as constant terms, while the transitory effects are captured by the residual term, ε_i, which is assumed to be individually and independently distributed (i.i.d.). The second model is the error component model, which specifies both the permanent and transitory unobserved effects within the earnings function's residual term. The assessment of the impact of the permanent and transitory components on earnings is done, for both models, by examining the magnitude of the variance of both components.

Using the error component model, Lillard and Willis (1978) show for the United States that individuals who are poor in any given year have lower permanent earnings than those who are not below the poverty line and are more likely to be in a low income spell as much as six years later. These differences are based on unmeasured factors, as well as on measured characteristics, such as educational attainment and experience. Moreover, the authors found that between 1967 and 1973 the probability of ending a year-long poverty spell for whites and blacks in the U.S. was 55 per cent and 35 per cent, respectively. Finally, the majority of cross-section earnings variation can be explained by permanent rather than transitory factors, thereby indicating that, over time, individuals are more likely to keep their position in the earnings distribution rather than move up or down.

The fixed effects model was used to estimate low income persistence among men (Gottschalk (1982)), as well as among children (Duncan and Rodgers (1991)) in the United States.

Gottschalk's (1982) results reveal that a significant amount of variability in earnings is explained by transitory variations, but that there exists a considerable amount of permanence within the low earnings population. Furthermore, certain specific factors (e.g. being non-white, older, having a low educational attainment, living in the South of the United States or outside a Standard Metro Statistical Area (SMSA)) were shown to increase the probability of having permanent low earnings more than to increase the probability of having temporarily low earnings. Duncan and Rodgers (1991) measure poverty persistence among children in the United States using after-tax income that includes food stamps benefits. Their results indicate that there has not been an increase in poverty persistence among black and white children between the late 1960s and early 1980s. The authors note, however, that this absence of change in the duration of poverty among children masks significant changes that have occurred in the statistical and demographic structure of poverty persistence among children. These changes include an increase in the inequality and in the mean of the distribution of permanent income-to-needs ratios between the late 1960s and early 1980s, an increase in the number of lone-parent families and in the educational attainment of young adults, and a decline in the number of children per family, in the average age of the parents of poor children, and in the earnings of young workers.

While the components-of-variance approach has provided some insights on the income dynamics of male workers, and to some extent of children, it has been criticised for its shortcomings as an estimation procedure for "understanding the dynamics and nature of poverty for the entire population" (Bane and Ellwood (1986), p.3). Indeed, this approach has been primarily used to study the income dynamics of male workers, neglecting the family aspect of poverty, as well as the income dynamics of women, children, and of the elderly. The

incorporation of family aspects into the component-of-variance approach can be done by using family income relative to the poverty threshold for every individual and by assuming that the "family" income-to-needs ratio has a permanent and a transitory component, similarly to the individual earnings specification. However, this adjustment also has some shortcomings. Any changes in the income-to-needs ratio would be treated equivalently, as it is impossible to assess if these changes are caused either by the departure or entrance of a family member, by variations in earnings of the individual or by variations in other sources of income. Additionally, as Bane and Ellwood (1986) point out, while the notion of a permanent component in earnings makes sense, the application of this notion to family income is questionable as family situations are constantly changing.

Another shortcoming of the components-of-variance approach is the fact that all deviations from permanent income are usually looked upon as identical, that is, as random and behaviourally equivalent. In reality, fluctuations in family income will not have systematically the same long-run dynamics: for example, temporarily laid-off workers do not have the same long-term poverty prospects as ageing workers who have lost their job due to a physical disability.

Duration Analysis

The third approach used to assess the persistence of low income spells is duration analysis, a method which has been widely used in economics to measure the persistence of unemployment[4]

---

[4] See Baker and Rae (1993) and Ham and Rae (1987) for Canada; Meyer (1990) for the United States.

and social assistance receipts.[5] This approach estimates the conditional probabilities of exiting a particular situation, such as an unemployment or low income spell, at a precise moment in time. While the use of duration analysis is relatively recent in economics, this estimation procedure has evolved rapidly, allowing the development of numerous nonparametric, parametric, and parametric estimation procedures (see Meyer (1990) and Kiefer (1988)).

Bane and Ellwood (1986) were among the first to model the dynamics of poverty with a duration analysis approach. Their approach focuses on single spells, on differences between the persistence of poverty for individuals currently poor and of those who are just entering a poverty spell, and on key events which lead an individual into or out of a poverty spell. Their findings indicate that, for the United States, while the majority of individuals who fall below the poverty threshold will be poor for a relatively short period of time, the majority of individuals who are currently poor are in the midst of a long poverty spell. Additionally, these authors show that the largest cause of movement into (out of) poverty is a decrease (increase) in the household head's earnings. Stevens (1994) updates Bane and Ellwood's (1986) work by examining the frequency of multiple spells of poverty and the evolution of exit rates over time, and by extending the time period under study.[6] Her results show that the likelihood of ending a poverty spell has declined over time, especially for someone living in a female-headed household. Moreover, more than

---

[5] See Lacroix (1997), Duclos *et al.* (1996), Fortin, Lacroix and Thibault (1996), and Barrett and Cragg (1995) for Canada; Hoynes and MaCurdy (1994), Gottschalk and Moffitt (1994), and Blank (1989) for the United States.

[6] Bane and Ellwood (1986) focus on poverty spells in the United States between 1970 to 1981. Stevens (1994) extends the analysis to 1987.

half of those who have ended a poverty spell will fall back into poverty within a five year time period.

In another paper, Stevens (1995) focuses on the estimation of multiple spells of poverty. In order to assess multiple spells, she develops a hazard model that estimates two series of hazard rates monitoring the movements into and out of poverty while adjusting for unobserved heterogeneity in personal characteristics as well as for observable characteristics. To verify the robustness of her results, Stevens compares them with those generated by two alternative approaches: the components-of-variance method and the simple count approach. Overall, she finds that the duration analysis and simple count approaches yield similar results while the results from the components-of-variance approach are generally less in agreement with those obtained using the two alternative methods. Her results also highlight the importance of considering multiple spells in the analysis of poverty persistence: assessments of poverty spells that only rely on single spells will significantly overestimate the degree of mobility out of poverty (also see Jarvis and Jenkins (1997) for Britain).

As previously mentioned, the literature on low income persistence in Canada is practically non-existent. The Economic Council of Canada (1992) used LAD (1982-1986) to study the dynamic dimension of poverty. They find that working-age adults have approximately an equal chance of staying in or exiting their one year poverty spell and a probability of 0.21 of falling back into poverty after one year above the low income threshold. Moreover, they show that overall, approximately one in three Canadians are likely to fall into poverty at least once during their working careers. Recently, Morissette and Bérubé (1996) analysed the dynamics of low earnings by focusing on a sample of male workers contained within a longitudinal dataset from

Revenue Canada's T-4 Supplementary tax file. Using a duration model based on discrete time analysis, these authors demonstrate that the probability of moving out of a low earnings spell has slightly dropped for male workers under 35 years of age, indicating that the duration of low earnings spells among young workers has increased. Moreover, these authors show that young workers experiencing a low earnings spell received significantly lower real pre-tax annual wages than their counterparts received between 1975 and 1984. Finally, they show that long-term inequality in the earnings of male workers rose at the same pace as inequality in their annual earnings.

Morissette and Bérubé (1996) produced important results on the duration of low earnings spells for working males in Canada, but provided no information on women, children, the elderly, and non-working men. Furthermore, the dataset used to conduct their estimations lacked information on key variables - such as educational attainment, family type and union status - that could well influence a person's likelihood to be in or out of a low income spell. Additionally, the estimation was done using individual earnings rather than family income, ignoring the fact that low income is a concept that applies to families and not to individual members in a family. Finally, the nature of the authors' unit of analysis, a spell-year of low earnings, did not permit them to examine the issue of multiple spells of low earnings.

III. DATABASE AND DESCRIPTIVE STATISTICS

A. Database

The sample used in this paper to assess low income persistence is Statistics Canada's Longitudinal Administrative Databank (LAD) which follows a random sample of individuals

selected from the T1 Family File (T1FF) from 1982 to 1993 inclusively.[7] The T1FF contains information from Revenue Canada's annual T1 personal income tax form. LAD is a random sample of taxfilers and non-filing spouses present on the T1FF for whom a Social Insurance Number (SIN) was reported. Thus, seventy-two per cent of the T1FF is either a taxfiler or an imputed spouse of a taxfiler. The LAD sample is drawn from this 72 per cent. Although the T1 form is individual-based, taxfilers must provide information on their spouse, children and other dependants in order to receive refundable tax credits. This information allows the merging of taxfilers into families and the imputation of non-filing dependants.[8] LAD's coverage of the population as measured by official population estimates has risen steadily over the years reaching 97.1 per cent by 1993 when information on family members is taken into account.

The analysis focuses on individuals whose pre-tax family income fell below a specified low income threshold at least once during the sample period.[9] To capture completely the impact of government transfers on one's probability of exiting or re-entering a low income spell, the analysis was performed symmetrically for two measures of family income: total family income and private (market) family income. The latter includes wages and salaries, self-employment,

---

[7] More details on T1FF and LAD can be found in Clark (1997) and Laroche and Ruggeri (1996).

[8] The families created in T1FF, and consequently in LAD, are census families. They are defined as either husband and wife (or common-law) family with or without single children, or as a lone parent with single children. Furthermore, a person living either alone, with unrelated individuals, or with relatives that are not classified as a husband and wife or as a lone parent relationship, is classified as a non-family person.

[9] It is implicitly assumed that there is complete income-sharing among family members. See Sharif and Phipps (1994) and Phipps and Burton (1993) for an analysis of child poverty based on the assumption of minimal sharing among family members.

and investment income, while the former also includes government transfers and tax credits to individuals. A detailed definition of both measures of income can be found in Appendix A.

LAD's coverage of social assistance income is inconsistent during the sample period.[10] Prior to 1986, there are no data available on social assistance income, as it was not required to compute the amount of non-taxable income received on the T1 form. Since then, various tax measures[11] have increased the incentives to report non-taxable income and since 1992, social assistance income is accounted for in the calculation of total income. In 1993, T1FF's coverage of social assistance income represented 76.6 per cent of the amounts paid out by the provinces and municipalities.[12] This shortcoming need not create a bias in the measurement of low income. Indeed, the National Council of Welfare (1987) stipulates that families relying solely on transfer payments fall well below the low income threshold and consequently, would be correctly classified as being below the low income threshold, regardless of underreporting.[13]

Since the vast majority of individuals aged 65 or older are typically out of the labour force, they live off a relatively fixed amount of income and are not likely to be subject to movements in

---

[10] This also applies for workers' compensation payments and net federal supplements received, such as Guaranteed Income Supplement and Spouse's Allowance.

[11] These measures encouraged individuals to report their non-taxable income so they would receive supplements from established credits, such as the federal sales tax and the child tax credits.

[12] As reported in the National Accounts. No study has yet been conducted for LAD. Since LAD is a random subsample of T1FF, both samples should have similar coverage.

[13] The National Council of Welfare's analysis was done using the Low Income Cut-Offs (LICOs). In 1986, welfare income ranged from 23 to 85 per cent of the low income threshold. It is important to note that while the underreporting *per se* may not bias our results, its variability across years may bias the estimated change in low income rates (Dooley (1994)).

and out of low income spells. Consequently, we have censored the presence pattern of those who turned 65 during the period covered by the sample. Furthermore, the nature of our analysis does not allow us to keep individuals who are sporadically missing from the sample or exhibit a left-censored (birth-like) pattern. Consequently, only individuals who are present for the complete sample period or who exhibit a right-censored (death-like) presence pattern are used in the estimation of low income persistence in Canada. Non-residents, Yukon and Northwest Territories residents and filing children[14] were also eliminated as potential units of analysis.

The low income measure used in this analysis is Statistics Canada's Low Income Measure (LIM), which is defined as fifty per cent of the adjusted median family income.[15] Family income is adjusted using Statistics Canada's adult equivalence scale which treats the first adult within a family as one person, each additional adult as 0.4 of a person and each child below 19 years of age as 0.3 of a person. In a lone-parent family, the first child is counted as 0.4 of a person, regardless of age. This adjustment makes it possible to take account of family size and composition and hence, of the economies of scale in family consumption. Individuals are said to be in a low income spell if their family income falls below the LIM in any given year.

---

[14] In LAD, children are defined as single individuals living with one or both parents, regardless of age. Filing children were excluded as units of analysis since it is not possible to determine if one or both parents have income. Only total family income is provided.

[15] The LIMs were chosen over the Low Income Cut-Offs (LICOs), because, contrary to the LICOs, LIMs can be calculated on the basis of census families.

B. Descriptive Statistics

The incidence of low income has been widely studied in Canada. Recent analyses have particularly focused on child poverty (Picot and Myles (1996), Zyblock (1996), Sharif and Phipps (1995), Dooley (1994), and Phipps (1994)) and on the impact of government transfers on the alleviation of low income (Crompton (1996), Phipps (1995), Dooley (1994), and Hanratty and Blank (1992)). This paper limits itself to a brief descriptive discussion of low income incidence for the non-senior Canadian population based upon data tabulated from the LAD dataset. All calculations were done using constant 1993 dollars.

Since LAD is a new source of data for income analysis, it is important to compare it with other well-established sources of data. When compared to the Survey of Consumer Finances (SCF), the median total income for all families from T1FF lies systematically below that of the SCF, thereby generating a lower LIM than the one found with the SCF. The effects of this level bias on low income rates are ambiguous as they directly depend on the differences in the income distribution of both sources of data.[16]

Our results first corroborate numerous studies, which have stressed the decline in the late eighties - early nineties of the real average and median family income of Canadian families (see, for example, Beach and Slotsve (1996)). While the average private family income of non-senior

---

[16] A table comparing the median total income found in T1FF and SCF can be found in Appendix B. Information on the income distribution of both data sources was unavailable to the author. A more detailed table was produced to compare the mean family income of non-senior families from LAD and SCF and is available upon request from the author. This table shows that the direction of the bias varies across family types. These differences do not affect the LIMs since they are calculated from the total distribution, but may affect the low income rates to the extent that the distribution at the left of the distribution differs between the two data sources.

Canadian families measured in 1993 dollars rose from $40,400 to $44,000 from 1982 to 1989, it has since then steadily declined to reach a new low in 1993 at $39,000.[17] A similar pattern is detected for the average total family income although the decline observed in the early nineties was not as pronounced as the one found with average private family income.[18] Figures 1 and 2 illustrate the evolution of the average total and private family income by various family types. These figures show that husband-wife families with two incomes have seen their average family income rise while lone-parent families, non-family persons and particularly husband-wife families with one income have suffered from the downward trend.[19]

This downward trend in the purchasing power of Canadian families is also reflected in the evolution of the median family income, regardless of the measure of income used. In 1993, the median private income of non-senior Canadian families was $4,200 below its 1982 level and $5,300 below its 1989 level. While the median income decline is less pronounced for total family income, there is still a $2,300 differential between 1982 and 1993 and a $3,600 differential between 1989 and 1993. Moreover, as depicted by various studies, the gap between the average (or median) total and private family income has widened through the years, reflecting the increasing importance of government transfers as a source of income for Canadian families.

---

[17] A family is said to be a non-senior family if the family member selected in LAD is 64 years of age or less.

[18] In 1982, the average total family income was $42,900. It peaked in 1989 at $47,100 and then steadily declined to reach $43,600 in 1993.

[19] The classification of families was made on the basis of the taxfiler's and/or his/her spouse's income.

Figure 1. Mean Total Income by Family Type, 1982-1993, 1993 Constant Dollars.

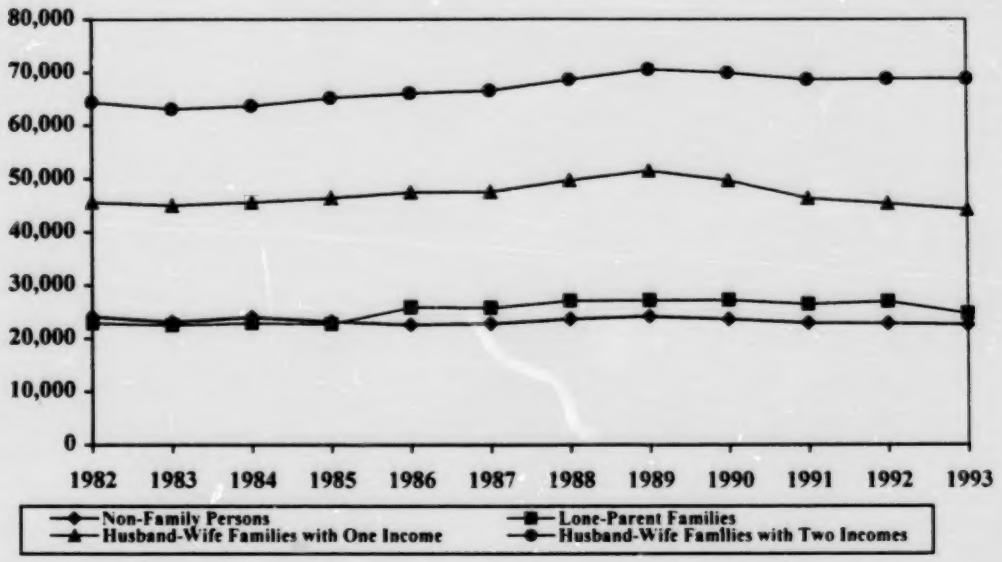
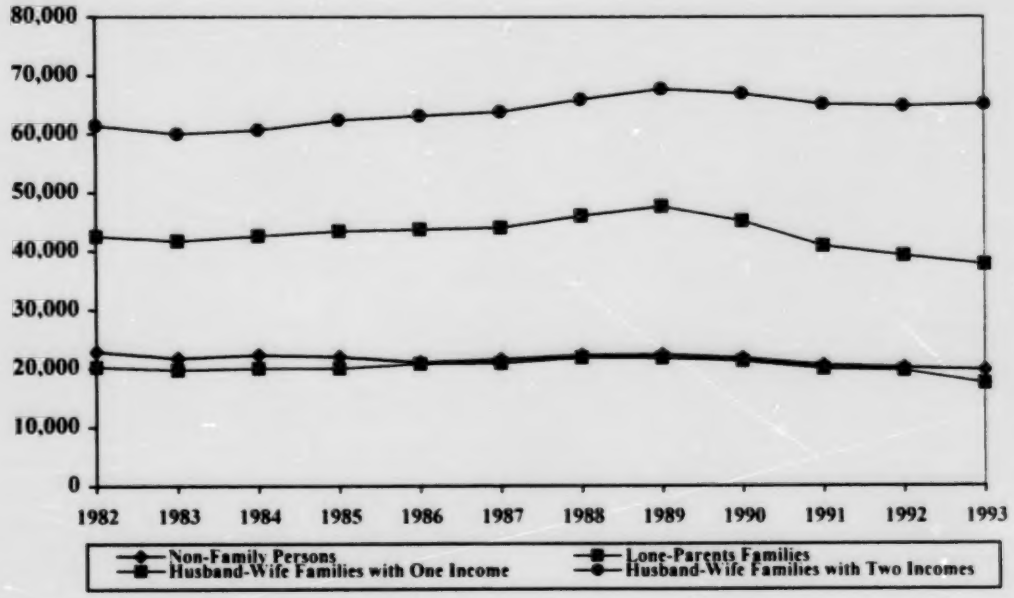


Figure 2. Mean Private Income by Family Type, 1982-1993, 1993 Constant Dollars.



While the low income rates for non-senior Canadian families remained relatively constant in the 1980s for both measures of income, it has since been steadily increasing to reach 28 and 23

per cent in 1993 when measured in terms of private and total family income, respectively. Moreover, as shown in Figure 3, the gap between the two low income rates has widened since the beginning of the 1990s. When analysed at a more disaggregated level, one notices that the low income rates by family type have experienced different trends. As illustrated in Figures 4 and 5, the proportion of lone-parent families whose total family income fell below the LIM has fallen through the years to reach 46 per cent in 1993, while the private family income of 57 per cent of lone-parent families fell below the low income threshold in 1993. Thus, transfer payments have become increasingly important in the alleviation of low income for lone-parent families. Furthermore, the low income rates of husband-wife families with one income and of non-family persons have risen through the years while husband-wife families with two income have seen their incidence of low income fall.[20]

[20] One exception arises with the low income rate of husband-wife families with one income with no children measured with total family income.

Figure 3. Low Income Rates for All Families, by Income Measure, 1982-1993

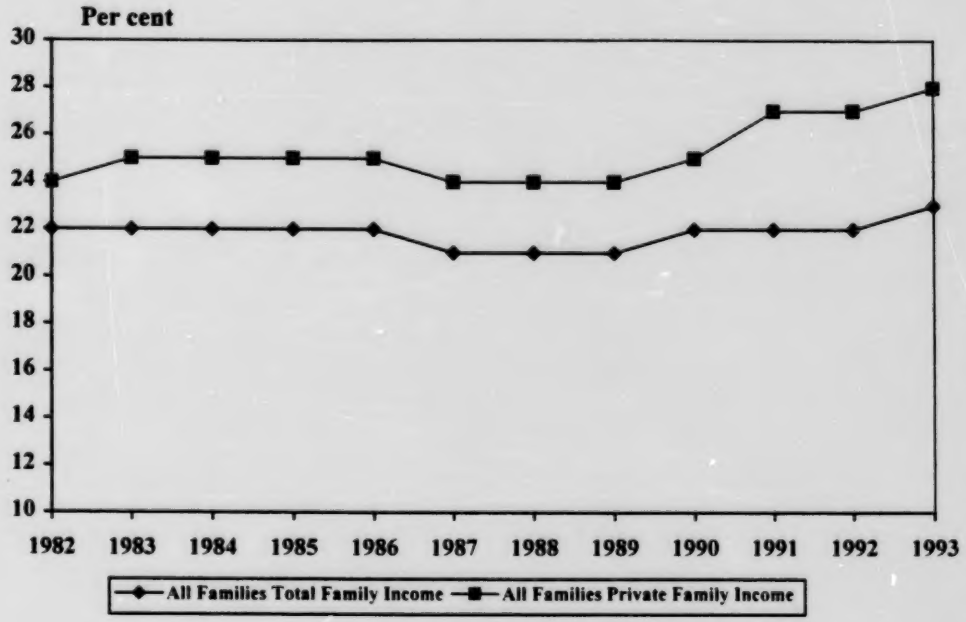


Figure 4. Low Income Rates by Family Type, Total Family Income, 1982-1993

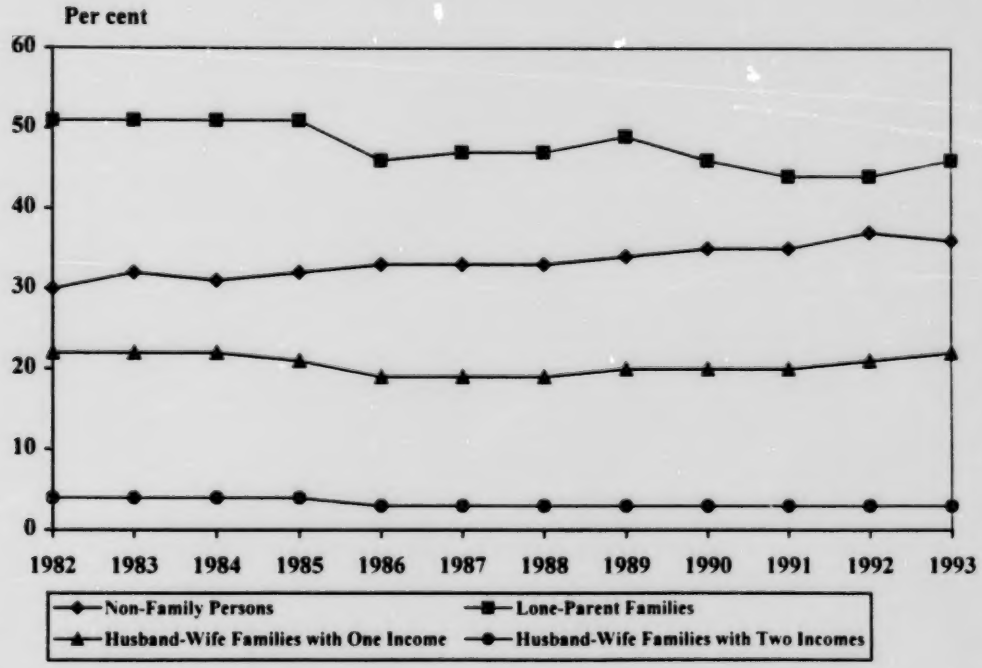
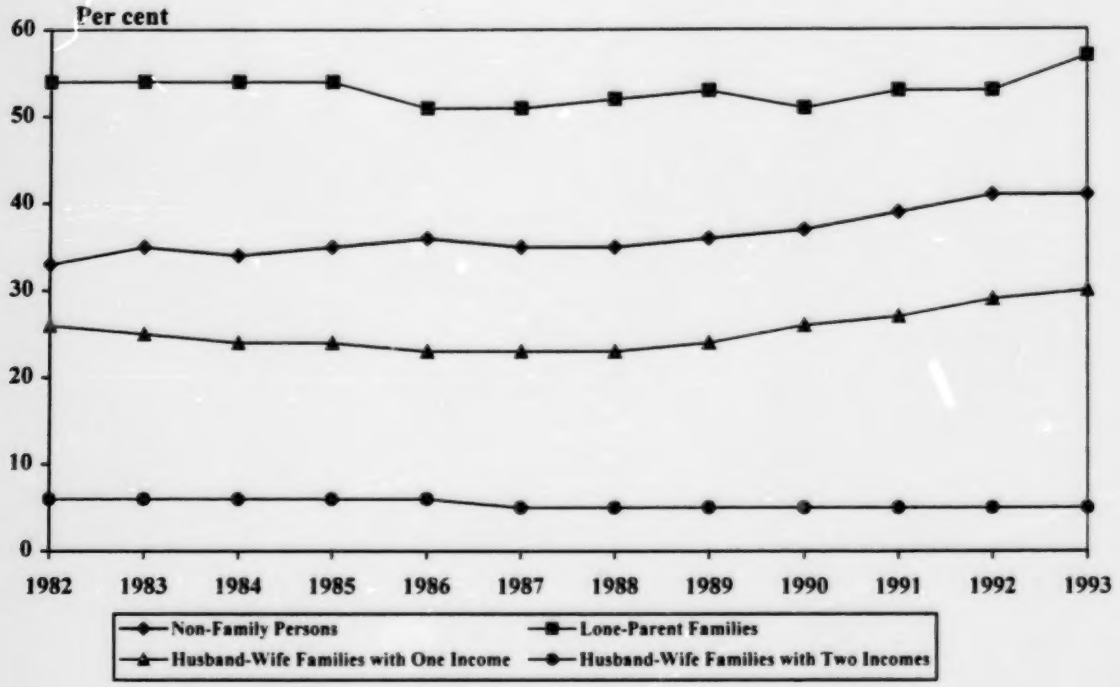


Figure 5. Low Income Rates by Family Type, Private Family Income, 1982-1993



IV. ESTIMATION PROCEDURE

The methodology used in this paper to assess the persistence of low income takes a discrete duration analysis approach that follows Stevens' (1995) methodology. To quantify the duration of low income spells, we estimate the probabilities of exiting and re-entering a low income spell at the period t+1, given that individuals were in (out of) a low income spell at t, by defining two series of hazard rates and adjusting for unobserved heterogeneity in personal characteristics, as well as for observable characteristics.

First, let the conditional probability of ending a non-censored low income spell be specified as a standard logistic function:

$$\lambda^s(t) = \frac{\exp(y_{idt})}{1+\exp(y_{idt})} \qquad (1)$$

$$\text{where } y_{idt} = \alpha^s_d + \beta^s X_{it} \qquad (2)$$

This specification has been previously used by Nickell (1979), Ham and Rae (1987), and by Baker and Rae (1993) to study the persistence of unemployment and employment spells; by Gunderson and Melino (1990) to analyse the duration of strikes and by Stevens (1995) to assess the duration of multiple poverty spells in the United States. The superscript s indicates the hazard function for exiting a low income spell, while the subscript i indexes individuals, d indexes the duration of the current spell and t indicates calendar time.[21] Equation (2) indicates that the probability of exiting a low income spell depends on its duration (α_d), on calendar year and on the individual's socio-demographic characteristics (X_{it}). These characteristics are sex, age, family type, number of children living at home, and marital status. Yearly dummy variables were included to control for calendar year effects, which control for, among other things, the effects of the business cycle and of policy changes. A descriptive list of all explanatory variables used in the analysis can be found in Appendix C.

---

[21] To lighten the notation, the subscripts i, d and t will be omitted from the notation when they are not directly involved in a summation or product procedure.

Second, the unconditional probability of observing a complete low income spell can be defined as the product of the probability of not exiting a low income spell prior to d years spent below the low income threshold and of the probability of exiting a low income spell after exactly d years spent below the low income cut-off. Algebraically, the unconditional probability of observing a complete low income spell of length d is:

$$f_i(d) = \left[\prod_{s=1}^{d-1} \frac{1}{1+\exp(y_{is})}\right]\left[\frac{\exp(y_{id})}{1+\exp(y_{id})}\right] \tag{3}$$

As it is commonly done in the literature, right-censored spells are taken into account in our analysis. The probability of observing a right-censored spell is defined as:

$$1 - F(d) = \prod_{s=1}^{d} \frac{1}{1+\exp(y_{is})} \tag{4}$$

Left-censored spells are excluded from the estimation procedure, as their inclusion would lead to biased estimates.[22]

The hazard function describing the conditional probability of falling back into a low income spell is identified by the superscript e and is specified identically to the conditional probability of exiting a low income spell:

---

[22] Stevens (1995) shows that the inclusion of left-censored spells in the estimation process, by assuming that those with spells of six years or more have the same duration effects, does not change the estimated results significantly, thereby making the bias arising from their exclusion very small.

$$\lambda^e(t) = \frac{\exp(z_{idh})}{1+\exp(z_{idh})} \tag{5}$$

$$\text{where } z_{idh} = \alpha^e_d + \beta^e X_{it} \tag{6}$$

The unconditional probability of observing a complete spell above the low income threshold of length d is:

$$g_i(d) = \left[\prod_{s=1}^{d-1} \frac{1}{1+\exp(z_{is})}\right]\left[\frac{\exp(z_{id})}{1+\exp(z_{id})}\right] \tag{7}$$

while the probability of observing a right-censored spell is defined as:

$$1 - G(d) = \prod_{s=1}^{d} \frac{1}{1+\exp(z_{isl})} \tag{8}$$

Unobserved Heterogeneity

The above specification assumes that the individual hazard rates do not vary within the sample. More precisely, the equations imply that everyone in the sample has the same probabilities of exiting or re-entering a low income spell and that these probabilities are independent across years. These assumptions are erroneous if there are unobservable person-specific characteristics, which affect the probabilities of exiting and/or re-entering low income spells within the sample. The absence of control over this unobserved heterogeneity in personal characteristics will lead to hazard rates, which show more negative duration dependence than there actually exists in individual behaviour. In order to control for unobserved heterogeneity, we use a semiparametric

approach proposed by Heckman and Singer (1984) and Nickell (1979).[23] This approach allows the constant term to vary across individuals through individual specific effects in personal characteristics. Equations (2) and (6) are rewritten to include the individual specific effects θ_i, which are characterised by a discrete distribution with two points of support. Algebraically:

$$y_{ndt} = \alpha_d^s + \beta^s X_{it} + \theta_k^s \tag{2a}$$

$$\text{and } z_{ndt} = \alpha_d^e + \beta^e X_{it} + \theta_k^e, \text{ where k=1,2} \tag{6a}$$

$\theta_k^s \in \{\theta_1^s, \theta_2^s\}$ and $\theta_k^e \in \{\theta_1^e, \theta_2^e\}$ indicate that there are two types of individuals in the sample who have different probabilities of exiting (re-entering) a low income spell. Let P_1 be the probability of being Type 1 and $P_2 = 1\text{-}P_1$, the probability of being Type 2 with respect to the probability of exiting a low income spell. The likelihood function relating to the probabilities of exiting a low income spell for individual i can be written as:

$$L_i = \sum_{k=1}^{2} P_k L_i(\theta_k) \tag{9}$$

This likelihood function focuses solely on single spells. If we normalise Type 1 to zero, then the likelihood function can be written explicitly as:

$$L_i = P_1 \prod_{z=1}^{nc1} f_{iz}(d) \prod_{z=1}^{pc1} (1 - f(d)) + (1 - P_1) \prod_{z=1}^{nc1} f_{iz}(d;\theta_2) \prod_{z=1}^{pc1} (1 - F_{iz}(d;\theta_2)) \tag{10}$$

---

[23] This approach has been widely used in the economic literature to incorporate unobserved heterogeneity. See, for example, Stevens (1995), Baker and Rae (1993) and Ham and Rae (1987).

where nci represents the number of non-censored low income spells and rci represents the number of right-censored low income spells.

We use the same estimation procedure to estimate the probabilities of re-entering a low income spell. This gives us a complete set of starting values for the estimation of multiple low income spells.

Multiple Spells

To fully grasp the persistence of low income spells, we allow for multiple spells of low income by specifying the hazard rates for exiting and re-entering a low income spell in a single likelihood function. As previously stated, Stevens (1995) demonstrates that not allowing for multiple spells significantly overstates the degree of mobility out of poverty. The likelihood function also controls for unobserved heterogeneity and allows every individual to vary in their disposition to come out of and fall back into a low income spell. Following Stevens (1995), every individual who ever fell below the low income threshold is characterised by the joint distribution of θ^x and θ^e. A total of four different types of individuals are present in the sample:

	θ^e_1	θ^e_2
θ^x_1	R_1	R_2
θ^x_2	R_3	R_4

where R_i i=1,2,3,4 are the probabilities of observing each of the four types of individuals and $R_4 = 1 - \sum_{i=1}^{3} R_i$. Although this specification may seem strict, since it only allows four different types of individuals, it enables us to link movements in and out of low income spells easily and in a tractable manner. As pointed out by Stevens (1995), an alternative approach would be to specify a specific distribution for unobserved heterogeneity with respect to each type of spell.

Let every individual be characterised by a vector $\Theta_k = \begin{pmatrix} \theta_k^s \\ \theta_k^e \end{pmatrix}$ which indicates his/her type with respect to their exit and re-entry rates. Every individual contributes to the following likelihood function:

$$L_i = \sum_{k=1}^{4} R_k L_i(\Theta_k) \tag{11}$$

or more explicitly:

$$L_i = \sum_{k=1}^{4} R_k \left(\prod_{z=1}^{mci} f_{iz}(d;\Theta_k) \prod_{z=1}^{mci} g_{iz}(d;\Theta_k) \prod_{z=1}^{mci} (1 - F_{iz}(d;\Theta_k)) \prod_{z=1}^{ci} (1 - G_{iz}(d;\Theta_k)) \right) \tag{12}$$

where mci and ci represent the number of non-censored and right-censored spells above the low income threshold, respectively. Coefficients for α_d, β, R_k and Θ_k can now be estimated by the maximisation of equation (11).

V. RESULTS

The estimations were done for two measures of income: total family income (TFI) and private family income (PFI). For both measures of income, a low income threshold (LIM) was calculated from LAD as fifty per cent of the median total (private) family income. Our estimation samples were then created by selecting individuals whose total (private) family income fell at least once below the LIM calculated for total (private) family income. The total family income sample (henceforth Tlims) regroups 17,390 individuals while the private family income sample (henceforth Plims) regroups 21,500 individuals.[24] Approximately 14,790 individuals are present in both samples, thereby leaving 2,600 and 6,710 individuals who are only present in Tlims or Plims, respectively. Thus, government transfers were not sufficient to push the majority of individuals who fell below the LIMs calculated with private family income above the low income threshold defined by total family income.

In general, individuals present in either sample experienced only one low income spell during the twelve-year sample period. 23,400 and 29,240 low income spells were recorded in Tlims and Plims, respectively. The average length of a low income spell recorded in Tlims and Plims was 2 and 2.1 years, respectively, while the average length of an individual's low income spell was 2 and 2.2 years, respectively. Moreover, the average family income over the sample period (1982

[24] Owing to the nature of the data, all numbers relating to individuals have been rounded for confidentiality.

to 1993) was $33,400 and $31,000 for Tlims and Plims, respectively, while the median family income was $27,200 and $25,700, respectively.[25]

1. Non-Parametric Estimation

Exit Rates

Our first set of results relating to the persistence of low income spells was generated using a nonparametric (Kaplan-Meier) approach, which simply divides the number of individuals ending (re-entering) a non-censored low income spell after exactly t years below (above) the low income threshold by the total number of individuals who have been below (above) the low income threshold for at least t years. The second and third columns of Table 1 show that, for both measures of income, the estimated probability of exiting a low income spell declines considerably with duration. The estimated probability of ending a low income spell after one year is 0.53 when the income measure includes transfer payments and falls to 0.50 when only private income is taken into account, giving individuals an equal chance of staying in or exiting their one year spell.[26] After three of more years, there is little chance of exiting a low income spell. Moreover, the inclusion of transfer payments in the definition of family income raised the estimated exit rates only by a few percentage points. However, the gap between the probabilities of exiting a low income spell obtained with total and private family income increases with the

---

[25] 1993 dollars.

[26] The two coefficients are significantly different from each other at the 95 per cent confidence level.

length of the low income spell, thereby indicating that the impact of transfer payments is more significant as the length of the low income spell increases.[27]

Table 1: Estimated Kaplan-Meier Exit and Re-Entry Rates.

Duration	Exit Rates			Re-Entry Rates		
	Tlims	Plims	Difference	Tlims	Plims	Difference
	A	B	C=A-B	A	B	C=A-B
1	0.5298	0.5041	0.0257	0.1916	0.211	-0.0194
	(0.0035)	(0.0031)		(0.0032)	(0.0031)	
2	0.3892	0.3373	0.0519	0.1125	0.135	-0.0225
	(0.0053)	(0.0045)		(0.0030)	(0.0031)	
3	0.3274	0.2546	0.0728	0.0834	0.0968	-0.0134
	(0.0070)	(0.0056)		(0.0030)	(0.0031)	
4	0.2745	0.2158	0.0587	0.0648	0.0742	-0.0094
	(0.0088)	(0.0068)		(0.0030)	(0.0030)	
5	0.2387	0.176	0.0627	0.0556	0.0643	-0.0087
	(0.0108)	(0.0079)		(0.0032)	(0.0032)	
6	0.23	0.1465	0.0835	0.0506	0.0599	-0.0093
	(0.0133)	(0.0089)		(0.0035)	(0.0035)	
7	0.2097	0.1538	0.0559	0.0453	0.050	-0.0047
	(0.0163)	(0.0112)		(0.0039)	(0.0039)	
8	0.225	0.1471	0.0779	0.0473	0.0561	-0.0088
	(0.0209)	(0.0136)		(0.0052)	(0.0052)	
9	0.2174	0.122	0.0954	0.0395	0.0412	-0.0017
	(0.0272)	(0.0162)		(0.0071)	(0.0064)	
10	0.1818	0.0952	0.0866	-	-	-
	(0.0368)	(0.0203)				

Standard errors are in parentheses

[27] The estimated coefficients under Tlims and Plims were found to be significantly different from each other at the 95 per cent confidence level.

Re-Entry Rates

A similar pattern is found when we examine the probabilities of re-entering a low income spell (fourth and fifth columns of Table 1): for both measures of income, the estimated probability of re-entering a low income spell decreases with time spent above the low income threshold. However, the gap between the point estimates of the probabilities obtained with the two measures of income remains more or less constant with duration. Thus, transfer payments only have a marginal impact on the re-entry hazard rates. The estimated probability of re-entering a low income spell after one year above the low income threshold is 0.19 for Tlims and 0.21 for Plims while after four years out of a low income spell, the estimated probability falls to 0.06 for Tlims and to 0.07 for Plims.

2. Single Spells

A. Without Unobserved Heterogeneity

We next estimated the probabilities of exiting and re-entering a low income spell using the logit framework discussed in Section IV. Estimated results for the exit and re-entry rates can be found in Appendix D. The presence of an asterisk beside a reported standard error indicates that the variable is significant at the 95 per cent confidence level.[28]

[28] On the basis of a two-tailed test.

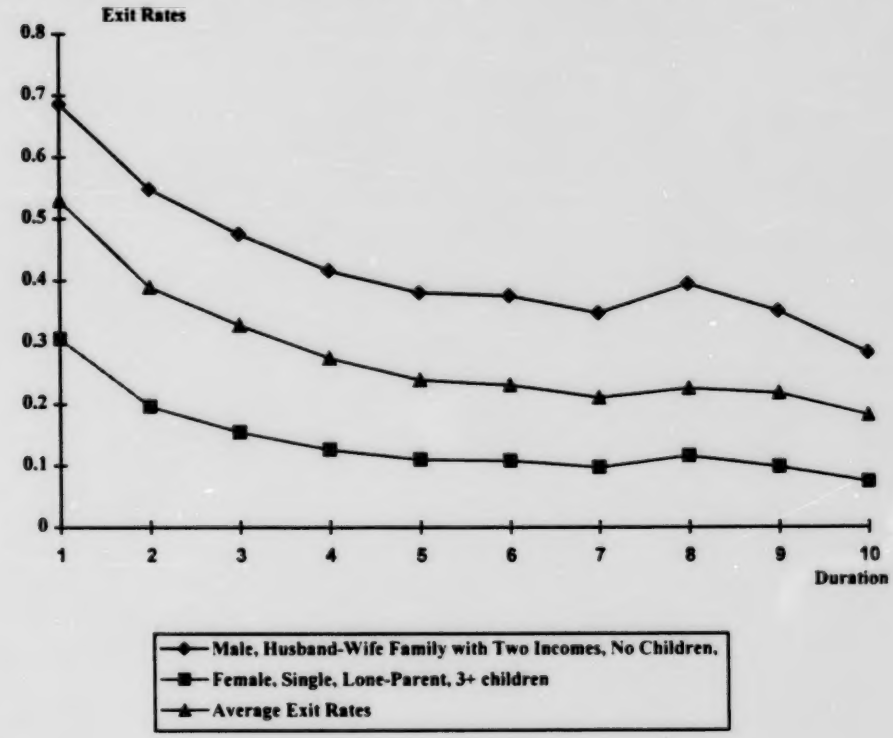
Exit Rates

Our results first indicate that there is negative duration dependence in the probabilities of exiting a low income spell, regardless of the income measure used (See Figure 6). In 1993, individuals representing the reference or baseline case - married men aged between 35 and 39 living in a husband-wife family with two incomes with no children - who have experienced a short low income spell generally have a higher probability of exiting a low income spell when private family income is used as the income measure. This result somewhat differs from those obtained with the non-parametric approach. Moreover, as shown in Table 2, when we examine different combinations of socio-demographic characteristics, we see that some types of individuals with relatively short low income spells have a higher probability of exiting their precarious situation under the private family income measure than under total family income. The differences between the probabilities of exiting a short low income spell under Plims and Tlims can be partly explained by the fact that the amount of transfer payments varies considerably by family type and that these payments are sometimes insufficient to push low income families whose private family income is above the LIM calculated with private family income above the low income threshold defined by total family income. This result can also be partly attributed to the fact that the inclusion of transfer payments into our definition of family income likely influences the *level* of the low income measure (LIM), thereby reducing their impact on the probabilities of exiting a low income spell.

Table 2. Estimated Exit Hazard Rates by Socio-Demographic Characteristics, 1993

Socio-Demographic Characteristics Reference Age Group: 35 to 39	Children/ Marital Status	Exit Rates					
		TLIMS Duration			PLIMS Duration		
		1	4	6	1	4	6
Male							
1) Lone-Parent, Divorced with	1	0.535	0.272	0.239	0.512	0.228	0.165
	2	0.488	0.237	0.207	0.451	0.188	0.134
	3+	0.427	0.196	0.170	0.403	0.160	0.113
2) Lone-Parent, Single with	1	0.552	0.287	0.253	0.541	0.249	0.182
	2	0.506	0.250	0.219	0.479	0.206	0.148
	3+	0.445	0.207	0.180	0.430	0.176	0.125
3) Lone-Parent, Separated with	1	0.573	0.304	0.269	0.608	0.260	0.187
	2	0.527	0.267	0.234	0.475	0.204	0.146
	3+	0.445	0.221	0.193	0.427	0.174	0.123
4) Non-Family Person	Divorced	0.438	0.202	0.176	0.490	0.213	0.153
	Separated	0.477	0.229	0.200	0.486	0.210	0.151
	Single	0.455	0.214	0.186	0.490	0.213	0.153
	Widow	0.461	0.218	0.190	0.456	0.191	0.137
5) Married, Two Incomes with	0	0.686	0.416	0.375	0.710	0.408	0.316
	1	0.774	0.528	0.485	0.765	0.479	0.381
	2	0.740	0.482	0.438	0.718	0.418	0.325
	3+	0.690	0.421	0.379	0.677	0.371	0.283
6) Married, One Income with	0	0.458	0.216	0.188	0.527	0.211	0.152
	1	0.570	0.302	0.266	0.558	0.263	0.193
	2	0.524	0.264	0.231	0.497	0.218	0.157
	3+	0.462	0.219	0.191	0.448	0.263	0.193
Female							
1) Lone-Parent, Divorced with	1	0.400	0.178	0.154	0.395	0.156	0.110
	2	0.370	0.160	0.138	0.368	0.132	0.099
	3+	0.323	0.135	0.116	0.326	0.120	0.084
2) Lone-Parent, Single with	1	0.382	0.167	0.145	0.394	0.155	0.109
	2	0.352	0.150	0.129	0.367	0.131	0.092
	3+	0.306	0.126	0.108	0.325	0.120	0.083
3) Lone-Parent, Separated with	1	0.372	0.162	0.140	0.348	0.131	0.092
	2	0.343	0.145	0.125	0.322	0.118	0.082
	3+	0.278	0.111	0.095	0.283	0.100	0.069
4) Non-Family Person	Divorced	0.402	0.180	0.155	0.430	0.176	0.125
	Separated	0.374	0.163	0.141	0.381	0.148	0.104
	Single	0.383	0.169	0.146	0.425	0.173	0.123
	Widow	0.434	0.200	0.174	0.427	0.433	0.688
5) Married, Two Incomes with	0	0.711	0.445	0.403	0.685	0.380	0.291
	1	0.771	0.524	0.480	0.766	0.480	0.382
	2	0.748	0.411	0.448	0.745	0.451	0.355
	3+	0.707	0.441	0.398	0.707	0.405	0.313
6) Married, One Income with	0	0.494	0.241	0.211	0.427	0.174	0.123
	1	0.572	0.303	0.268	0.529	0.240	0.175
	2	0.540	0.277	0.244	0.500	0.220	0.159
	3+	0.489	0.238	0.208	0.453	0.190	0.135

Figure 6. Estimated Exit Hazard Rates by Various Family Types, Total Family Income, 1993



As illustrated in Table 2, an individual's socio-demographic characteristics play a large role in determining one's likelihood of ending a low income spell. The results show that an individual's marital status, family type and family size (number of children) has a significant impact on the exit rates. When tested jointly, the estimated coefficients relating to sex[29] are significantly different from zero, thereby indicating that there is a significant difference between the probabilities of exiting a low income spell of men and women.[30] These differences in the exit

---

[29] That is, the variables Sex_F, S*MS_D, S*MS_W, S*MS_Sep, S*MS_Sin, S*MS_X, S*F_OIF, S*F_LPF, S*F_NFP, S*KID_1, S*KID_2, and S*KID_3. See Appendix C for a description of these variables.

[30] The Wald test values are 172.7 and 153.04 for Tlims and Plims, respectively.

rates of men and women vary considerably by family type. Women who are married (common law) and live in husband-wife family with one or two incomes, with or without children, tend to have similar probabilities of exiting a low income spell to those of men with identical characteristics. However, female lone-parent families have a much lower probability of exiting a low income spell than similar male lone-parent families.[31] For example, in 1993, after one year below the low income threshold, a divorced lone-parent woman living with two children had a probability of exiting of 0.37 and 0.34 for Tlims and Plims, respectively. After four years below the low income threshold, the probabilities were 0.16 and 0.13, respectively. The probabilities of exiting, if one belonged to a male lone-parent family with two children, were considerably higher reaching 0.49 and 0.45 for Tlims and Plims, respectively after one year in a low income spell and 0.24 and 0.19, respectively after four years in a low income spell.[32] Similar results, although not as pronounced, are found when one considers the situation of non-family persons, regardless of their marital status and income measure used. Thus, while women living in either a husband-wife family with one or two incomes tend to have similar odds as men of exiting a low income spell, the chances of exiting a low income spell for women living either as a non-family person or in a lone-parent family are significantly lower, regardless of the income measure used.

The results also indicate that, when tested jointly, the variables relating to calendar year have a significant impact on the exit rates. As shown in Figure 7 for total family income, the estimated exit rates for the baseline case rose from 1984 to 1986, remained more or less constant

---

[31] This result holds for all applicable marital statuses and regardless of the income measure used.

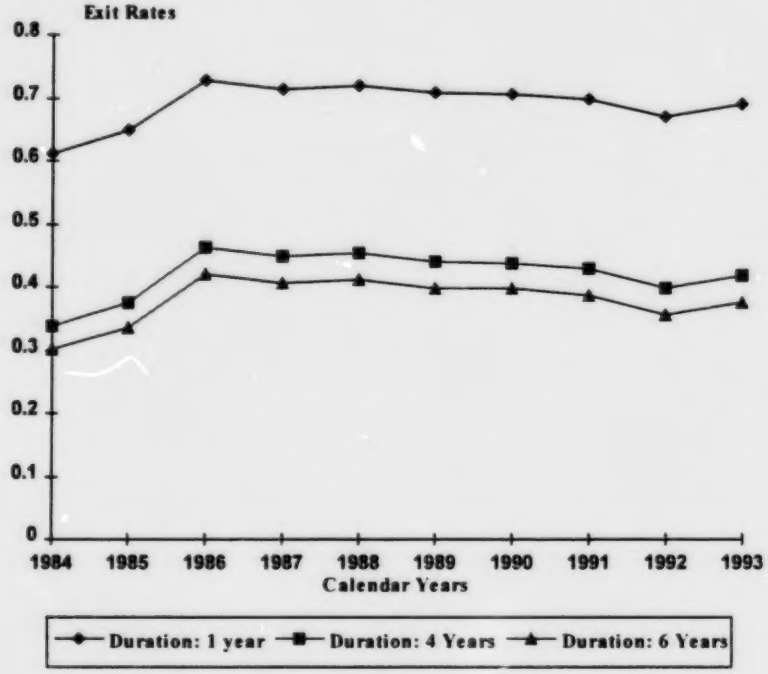
[32] These results are based on the following demographic characteristics the age group is 35 to 39 and the individual's marital status is divorced.

in the late 1980s and then fell with the deterioration of the economic climate in the early 1990s. Similar results were found under private family income. This relatively small impact of calendar year on the exit-rate can be explained by the fact that the low income rate defined by the LIM (fifty per cent of the adjusted median family income) move procyclically with the business cycle, thereby muting the effects of calendar years on the probabilities of exiting a low income spell. Finally, the estimated coefficients on age are jointly significantly different from zero, regardless of the income measure used. Under Plims, young and older individuals tend to have a lower probability of exiting a low income spell than that of the reference category, that is, of individuals aged between 35 and 39. Similar results are found under Tlims although fewer estimated coefficients are individually statistically significant.

Re-Entry Rates

As with exit rates, the estimated re-entry rates decline with duration (Table 3). For the baseline case, the probability of falling back into a low income spell after one year above the low income threshold was 0.12 in 1993 for both for Tlims and Plims. These probabilities fall to 0.04 after four years above the low income threshold. Moreover, Table 3 shows that, contrary to the results obtained with exit rates, individuals are in general less likely to fall back into a low income spell when transfer payments are included in the income measure. However, the differences between the two series of estimated re-entry rates are, in general, small.

Figure 7. Estimated Exit Rates for Males, Aged 35 to 39, Belonging to a Husband-Wife Family with Two Incomes and No Children, by Calendar Years, Total Family Income



As with the estimated exit rates, the probability of re-entering a low income spell varies significantly according to an individual's sex, age, marital status, family type and family size (number of children). Female lone-parent families have a much higher probability of re-entering a low income spell than male lone-parent families. For example, in 1993, the probability of re-entering a low income spell for a separated woman living with two children after one year above the low income threshold was 0.41 and 0.39 for Tlims and Plims, respectively, compared to 0.25 and 0.29, respectively, for a man with identical characteristics.[33] With respect to husband-wife families with one income, there is approximately a 20 per cent chance that these individuals will

[33] For both individuals, age is assumed to lie between 35 and 39 years.

fall back into a low income spell after one year above the LIMs. However, the probability of falling back below the LIMs decreases considerably with time spent above the low income threshold. Furthermore, the estimated coefficients on the calendar year variables are jointly statistically significant, thereby indicating that the effects of the business cycle and of policy changes captured by the variables calendar year influence an individual's probability of re-entering a low income spell. However, this effect is not very large, regardless of the income measure used.[34] Finally, the impact of age on the re-entry rates is more pronounced when private family income is used as the income measure.

B. With Unobserved Heterogeneity

The hazard rates were re-estimated to allow individual hazard rates to vary within the samples. During the estimation process, one of the support points (henceforth Type 1) of the heterogeneity distribution was normalised to zero. This normalisation was made possible by the inclusion of the full set of duration dummy variables. Estimation results can be found in Appendix E. The estimated coefficients on Type 2 were all significantly different from zero, thereby indicating the presence of unobserved heterogeneity in our samples.[35] In both samples, Type 2s have a higher

---

[34] Once again, this result can be explained by the procyclicality of the LIM rate.

[35] To calculate the hazard rates of Type 2 individuals, we simply include the estimated coefficient on θ in our calculations.

Table 3. Estimated Re-Entry Hazard Rates by Socio-Demographic Characteristics, 1993

Socio-Demographic Characteristics Reference Age Group: 35-39	Children/ Marital Status	Re-Entry Rates					
		TLIMS Duration			PLIMS Duration		
		1	4	6	1	4	6
Male							
1) Lone-Parent, Divorced with	1	0.211	0.075	0.057	0.243	0.092	0.070
	2	0.234	0.085	0.064	0.257	0.098	0.074
	3+	0.307	0.119	0.090	0.312	0.125	0.096
2) Lone-Parent, Single with	1	0.213	0.076	0.057	0.219	0.081	0.061
	2	0.236	0.086	0.065	0.231	0.086	0.065
	3+	0.309	0.120	0.090	0.283	0.111	0.084
3) Lone-Parent, Separated with	1	0.229	0.083	0.062	0.271	0.105	0.080
	2	0.253	0.093	0.071	0.285	0.111	0.085
	3+	0.329	0.130	0.099	0.326	0.141	0.109
4) Non-Family Person	Divorced	0.260	0.096	0.073	0.277	0.107	0.082
	Separated	0.280	0.106	0.081	0.306	0.122	0.093
	Single	0.262	0.098	0.074	0.250	0.095	0.072
	Widow	0.293	0.112	0.085	0.333	0.136	0.104
5) Married, Two Incomes with	0	0.118	0.039	0.029	0.124	0.043	0.032
	1	0.082	0.027	0.020	0.101	0.034	0.101
	2	0.093	0.030	0.023	0.107	0.036	0.027
	3+	0.129	0.043	0.032	0.136	0.047	0.136
6) Married, One Income with	0	0.277	0.104	0.079	0.263	0.101	0.077
	1	0.204	0.072	0.055	0.219	0.081	0.061
	2	0.227	0.082	0.062	0.231	0.086	0.065
	3+	0.299	0.115	0.087	0.283	0.111	0.084
Female							
1) Lone-Parent, Divorced with	1	0.295	0.120	0.091	0.280	0.109	0.083
	2	0.306	0.118	0.090	0.296	0.117	0.089
	3+	0.367	0.150	0.115	0.336	0.138	0.106
2) Lone-Parent, Single with	1	0.255	0.094	0.071	0.274	0.106	0.081
	2	0.265	0.099	0.075	0.289	0.114	0.087
	3+	0.322	0.126	0.096	0.330	0.134	0.103
3) Lone-Parent, Separated with	1	0.395	0.166	0.128	0.373	0.158	0.122
	2	0.408	0.173	0.134	0.392	0.168	0.130
	3+	0.475	0.216	0.169	0.438	0.197	0.153
4) Non-Family Person	Divorced	0.293	0.112	0.085	0.271	0.105	0.080
	Separated	0.393	0.164	0.127	0.363	0.152	0.117
	Single	0.253	0.093	0.071	0.265	0.102	0.077
	Widow	0.259	0.096	0.073	0.293	0.115	0.088
5) Married, Two Incomes with	0	0.099	0.032	0.024	0.120	0.044	0.033
	1	0.081	0.026	0.019	0.093	0.031	0.023
	2	0.085	0.027	0.020	0.099	0.033	0.025
	3+	0.108	0.036	0.027	0.099	0.034	0.025
6) Married, One Income with	0	0.251	0.092	0.070	0.309	0.123	0.094
	1	0.210	0.075	0.056	0.234	0.087	0.066
	2	0.219	0.079	0.059	0.248	0.094	0.071
	3+	0.270	0.101	0.077	0.285	0.111	0.085

probability of exiting a low income spell and a higher probability of falling back into a low income spell (see figures 8 and 9 for the baseline case). Moreover, even after controlling for unobserved heterogeneity, our results exhibit negative duration dependence in the exit and the re-entry hazard rates, regardless of the income measure used. These results were used as starting values for the estimation of the likelihood function comprising the probabilities of exiting and re-entering a low income spell.

Figure 8. Estimated Exit Hazard Rates for Males, Aged 35 to 39, Belonging to a Husband-Wife Family with Two Incomes and No Children, by Type of Individuals and Income Measure, 1993

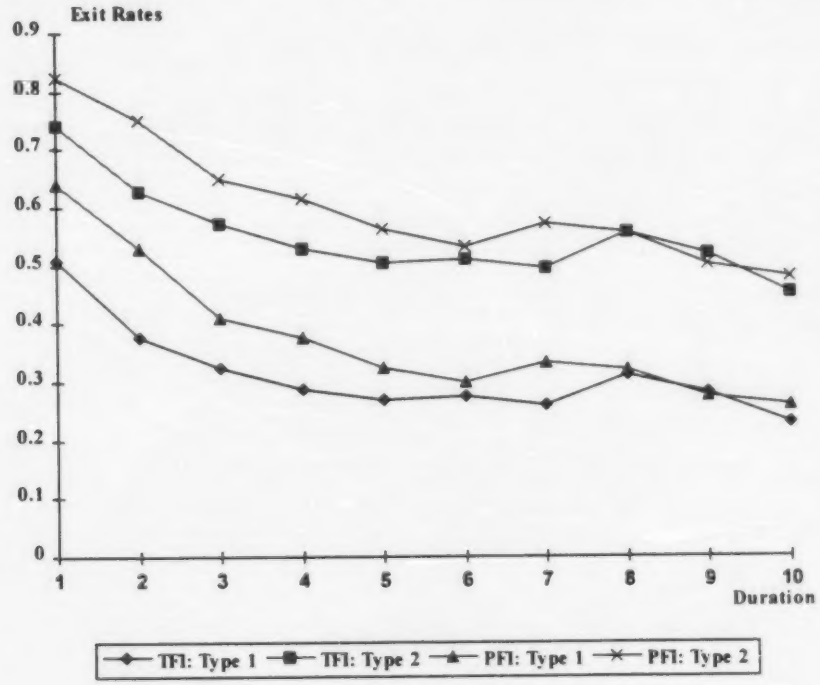
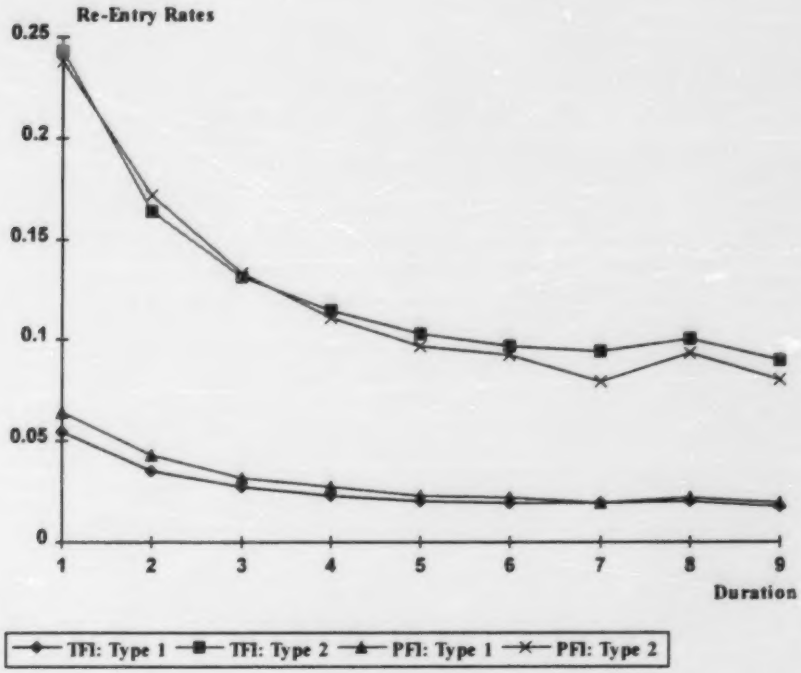


Figure 9. Estimated Re-Entry Hazard Rates for Males, Aged 35 to 39, Belonging to a Husband-Wife Family with Two Incomes and No Children, by Type of Individuals and Income Measure, 1993



3. Multiple Spells

Finally, we estimated the hazard rates for exiting and re-entering low income spells by allowing the unobserved heterogeneity terms to be correlated with one another. This allowed the presence of four different types (R1 through R4) of individuals within our samples. The estimated results for the Tlims and Plims samples can be found in Appendix F. Since the estimation procedure indicated that the estimated probabilities corresponding to R1 in Tlims and to R1 and R4 in Plims were very close to zero, these probabilities were restricted, allowing for 3 and 2 types of individuals for Tlims and Plims, respectively. Approximately 60 per cent of the Tlims sample was found to have relatively high probabilities of exiting a low income spell *and* relatively low

probabilities of falling back into a low income spell, while 40 per cent of individuals had relatively low probabilities of exiting *and* relatively high probabilities of re-entering a low income spell.[36] Similar results were found using Plims: 57.6 per cent of individuals were found to face relatively high exit rates *and* relatively low re-entry rates while 42.4 per cent of them faced relatively low exit rates and high re-entry rates (see Table 4). Thus, regardless of the income measure used and of socio-demographic characteristics, our results indicate that if an individual falls below the low income threshold, he/she has approximately a 60 per cent chance of being in a temporary low income situation, that is to be characterised by relatively high exit rates and relatively low re-entry rates, and a 40 per cent of being in a more chronic low income situation where it is more difficult to exit a low income spell and to stay above the low income threshold. Contrary to what has been observed for welfare spells in Canada (see, for example, Barrett and Cragg (1995)) and low income spells in Britain (Jarvis and Jenkins (1997)), our results suggest that, regardless of socio-demographic characteristics, there are not a lot of repeated movements in and out of low income spells.

Table 4. Distribution of Types by Income Measure

Total Family Income			Private Family Income		
	Exit Rates			**Exit Rates**	
Re-Entry Rates	High	Low	**Re-Entry**	High	Low
High	0.4	40.1	High	set	42.4
Low	59.5	set to zero	Low	57.6	set to zero

[36] 0.4 per cent of the Tlims sample was found to have a relatively high probability of exiting a low income spell and a relatively high probability of falling back into a low income situation.

Table 5 shows the probabilities of exiting and re-entering a low income spell for the baseline case by selected 'type', duration and income measure for 1993. As with the previously reported results, the probabilities of exiting and re-entering a low income spell fall with time spent below (above) the low income threshold. In 1993, men in their late thirties living in a husband-wife family with two incomes without children had a probability of exiting a one year low income spell that ranged between 0.55 and 0.87. After six years below the low income threshold, these probabilities ranged from 0.30 to 0.70.

Table 5. Estimated Entry and Re-Entry Rates for Males, Aged 35 to 39, Belonging to a Husband-Wife Family with Two Incomes and No Children, by Type of Individuals, Duration and Income Measure, 1993.

	Type of Individuals	
	High Exit, Low Re-Entry	Low Exit, High Re-Entry
Tlims		
1) Exit Rate		
Duration:		
1 year	0.840	0.545
4 years	0.717	0.367
6 years	0.701	0.349
2) Re-Entry Rate		
Duration:		
1 year	0.029	0.192
4 years	0.015	0.106
6 years	0.014	0.101
Plims		
1) Exit Rate		
Duration:		
1 year	0.866	0.587
4 years	0.728	0.371
6 years	0.665	0.304
2) Re-Entry Rate		
Duration:		
1 year	0.034	0.188
4 years	0.016	0.099
6 years	0.015	0.091

Women living either as a non-family person or in a lone-parent family are much more likely to experience long spells of low income and to fall back below the low income threshold once they manage to raise their family income above it than men with identical characteristics and women living in a husband-wife family with either one or two incomes. Husband-wife families with one income have approximately a 35 per cent chance of exiting a one year low income spell, a probability that is considerably lower than that of husband-wife families with two incomes (more than 50 per cent).[37] Moreover, transfer payments do not, in general, have a large impact on the probability of exiting or re-entering a low income spell. For example, in 1993 the probability of exiting a one year low income spell for a woman living alone with one child was 0.23 under Tlims and 0.22 under Plims.[38]

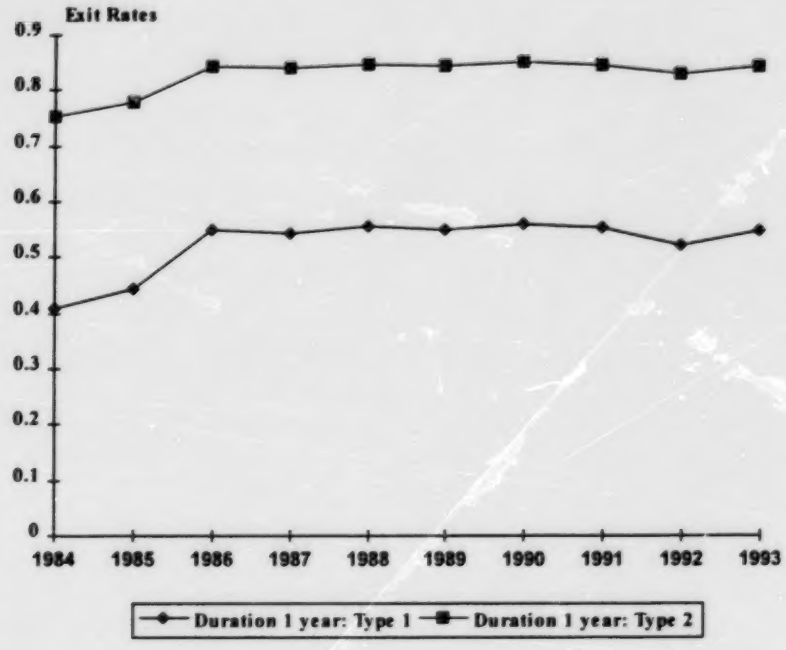
As with assessment of single spells of low income, the estimated coefficients relating to calendar year are jointly statistically significant, thereby indicating that calendar year effects have a significant impact on the likelihood of exiting (re-entering) a low income spell. However, due to the procyclicality of the LIM rate, the impact of the calendar year variables on the probabilities of exiting a low income spell has been relatively small over the years (Figure 10).

---

[37] This result holds for those of type R1 (low exit rates, high re-entry rates).

[38] Marital status is divorced. The age group is 35 to 39 years of age. This result holds for those of type R1 (low exit rates, high re-entry rates).

Figure 10. Estimated Exit Rates for Males, Aged 35 to 39, Belonging to a Husband-Wife Family with Two Incomes and No Children, by Calendar Year and Type, Total Family Income



Finally, as with the previously reported results, age has a significant impact on the likelihood of exiting or re-entering a low income spell. Under Tlims, individuals between 40 and 49 years of age have a higher (lower) probability of exiting (re-entering) a low income spell than the reference group (aged 35-39), while under Plims, young and older individuals tend to have a lower probability of exiting a low income spell and a higher probability of falling back below the low income threshold than the reference group.

Our estimated results allow us to conclude that, overall, women living either as a non-family person or in a lone-parent family have reduced chances of exiting a low income spell and not falling back below the low income threshold. The inclusion of transfer payments into our measure of family income does not significantly alter the results, regardless of family type. Moreover, our results indicate that, regardless of the income measure used and of socio-

demographic characteristics, approximately 60 per cent of the non-senior Canadian low income population is characterised by short stays below the low income threshold and low probabilities of re-entering a low income spell, and approximately 40 per cent experiences low income spells that are longer and more frequent, characterising a more permanent situation.

4. Simulations

To complete our picture of low income persistence in Canada, we simulated the average time individuals spend below the low income threshold over a ten year period and the percentage of individuals who spend more than half out of ten years below the LIMs by various socio-demographic combinations and age groups, using the point estimates obtained from our multiple spells hazard rate model. These simulations were performed using a theoretical approach.[39] More precisely, after specifying the first year (1983) as being below the low income threshold, we calculated the probabilities of all the different possibilities (2^9 or 512 possibilities) that could occur in the following nine years using the estimated coefficients obtained with the multiple spells hazard rate model. We then calculated the probabilities of being below the low income threshold for x years. This allowed us to calculate the average time spent below the low income threshold over a ten year period and the percentage of individuals who spend more than half out of ten years below the LIMs. The results can be found in Appendix G.

---

[39] A microsimulation technique used, among others, by Stevens (1995), Gottschalk and Moffit (1994) and Moffitt and Rendall (1993) was also used to conduct the simulations. The theoretical and microsimulation approaches are equivalent when an infinite number of individuals is simulated. Owing to their greater precision, only the results obtained from the theoretical approach will be presented in this paper. The results obtained using the microsimulation approach are available upon request from the author.

The simulations were performed using both income measures and two starting ages: 25 and 45. Socio-demographic characteristics are assumed to be constant during the ten simulated years, with the exception of age. The results confirm the importance of socio-demographic characteristics in determining low income persistence. Regardless of the starting age and of the income measure used, women living either as a non-family person or in a lone-parent family spend on average more than five out of ten years below the low income threshold. Women and children living in lone-parent families generally have more than a fifty per cent chance of living in a low income family for six or more out of ten years. Living in a husband-wife family with either one or two income greatly improves the economic status of women. Under Tlims, less than 36 per cent of married (common law) women living in a husband-wife family with one income spend more than five out of ten years below the low income threshold, while this percentage falls to less than 9 per cent for women living in a husband-wife family with two incomes.[40] Results found with Plims were similar although higher, while the results obtained when the starting age was 45 were, in general, lower.

While the situation for men living as a non-family person or in a lone-parent family tends to be better than that of women with identical characteristics, these families spend on average more than four years below the low income threshold and have approximately one chance in three of being in a low income situation for more than five out of ten years. These results are accentuated when the income measure does not include transfer payments. Thus, socio-demographic

---

[40] These results are for husband-wife families with one or two incomes with no children and represents the highest percentage obtained for both family types.

characteristics influence considerably an individual's economic prospects over ten years. Living either as a non-family person or in a lone-parent family considerably increases your chances of being below the low income threshold and of staying in a precarious situation for a lengthy period of time.

VI. CONCLUSIONS

This paper quantifies the persistence of low income spells in Canada by estimating the likelihood of exiting and re-entering a low income spell using a duration analysis approach that takes into account multiple spells of low income as well as observable characteristics and unobservable heterogeneity in personal characteristics. This assessment of the duration aspect of low income is a significant contribution to the issue of low income in Canada as it offers a new insight into the dynamics of low income for the non-senior Canadian population.

Our results first show that, regardless of the income measure used and of the socio-demographic characteristics examined, approximately 60 per cent of the non-senior Canadian low income population is characterised by relatively high exit rates and relatively low re-entry rates while approximately 40 per cent is characterised by relatively low exit rates and relatively high re-entry rates. Moreover, contrary to what has been observed for welfare spells, there is little evidence of repeated movements in and out of low income spells.[41]

---

[41] Under Tlims, 0.04 per cent of the low income population is characterised by relatively high exit rates and relatively high re-entry rates. The absence of churning can be partly explain by the fact that we are looking at the low income status of individuals annually, while welfare spells analyses are typically based on monthly or weekly

Second, our study highlights the importance of socio-demographic characteristics in determining the persistence of low income. Individuals belonging to husband-wife families with or without children (with either one or both spouses with income) are more likely to experience shorter and less frequent spells of low income than those living either living either as a non-family person or in a lone-parent family. This is particularly true for women. Women living either as a non-family person or in a lone-parent family are faced with relatively low exit rates and relatively high re-entry rates and are more likely to spend extensive periods of time below the low income threshold. For example, in 1993, a divorced woman living alone with two children had a probability of exiting a one year low income spell of 0.37 and 0.34 for Tlims and Plims, respectively and of 0.16 and 0.13, respectively, after a four-year low income spell. This situation is even more significant when we consider the growing number of children living in this type of family. These children have more than a fifty per cent chance of spending a large portion (six years or more) of their childhood below the low income threshold.

Third, while the inclusion of transfers into our definition of income raised (lowered) the estimated exit (re-entry) rates from low income spells only by a few percentage points, the impact of transfers is more significant as the length of the low income spell increases. This result could be explained in part by our choice of low income measure (fifty per cent of the median family income). In particular, the inclusion of government transfers and tax credits in our definition of family income likely influences the *level* of the low income measure, thereby

---

data. Moreover, when individuals move out of welfare, their family income may be insufficient to rise them above the low income threshold.

reducing the impact of government transfers and tax credits on the *probabilities* of exiting and re-entering low income spells. Moreover, this result could also be explained by the fact that some of the transfer payments are underreported in our sample. Finally, we should note that the transfer payment system was not primarily designed to lift families out of low income, but rather to supplement the earnings of low income families.

Fourth, while the calendar year variables were jointly significant, individuals who were below the low income threshold in 1993 had more or less the same probabilities of exiting (re-entering) a low income spell than in the mid-1980s. This result can be explained by our choice of low income measure. As incomes fall during a recession, for example, the median of the income distribution will also fall, thereby lowering the low income threshold defined by the LIM. The effects of the business cycle on the LIM rate, and consequently on the probabilities of exiting (re-entering) a low income spell, are thus muted by the fact that the treshold itself moves in a procyclical manner.

Finally, while most low income analyses focus solely on the incidence of low income, our study shows the pertinence of assessing the duration aspect of low income. The low income rates of husband-wife families with one income has remained more or less stable over the years, reaching 22 per cent in 1993. Our analysis of low income persistence shows that this type of family had approximately a fifty per cent chance (from 0.458 to 0.572) of exiting a one year low income spell in 1993. In addition, husband-wife families with one income spend on average

between 3.6 and 4.9 out of ten years below the low income threshold.[42] While incidence measures of low income provide a static picture of the low income situation, measures which take into account duration suggest that a significant proportion of husband-wife families with one income below the low income threshold experience relatively long low income spells. Thus, in order to provide effective policy measures that will effectively alleviate low income, both dimensions of low income need to be examined.

[42] Numbers based on total family income.

APPENDIX A

Definition of Private Family Income and Total Family Income

1. **Private Family Income**: wages and salaries (employment income from T4 slips and other employment income), alimony or separation allowance income, rental net income, interest and other investment income, net limited partnership income, dividends, registered retirement savings plan (RRSP) income, other pensions and superannuation, total net income from self employment, and other income.

2. **Total Family Income**: private family income + Canada and Québec pension plan benefits, family allowance, goods and services tax credits (includes the federal sales tax credit), non-taxable income (social assistance income, workers' compensation payments, guaranteed income supplement and spouse's allowance), old age security pension, provincial refundable tax credits, unemployment insurance benefits and child tax credit.

APPENDIX B

Income Comparison for Families: TIFF and Survey of Consumer Finances (SCF), 1982-1992. 1993 Constant Dollars

Year	Median Income, All Families		
	TIFF	SCF	% Ratio T1FF/SCF
1982	43,769	46,008	95.13
1983	42,710	44,800	95.34
1984	43,159	45,245	95.39
1985	43,614	46,128	94.55
1986	43,546	46,961	92.73
1987	44,070	47,514	92.75
1988	46,339	48,535	95.47
1989	47,025	49,825	94.38
1990	46,616	49,267	94.62
1991	44,318	47,020	94.25
1992	44,297	47,331	93.59

Sources: T1FF: 1982-1992, 100% Unpublished T1FF tabulations were used.
SCF: Cat. 13-208, annual publication
Both samples exclude Yukon and Northwest Territories residents.

APPENDIX C

List of Explanatory Variables

Calendar Years		***Number of Children***	
Year_83	1983	Kid_0	0
Year_84	1984	Kid_1	1
Year_85	1985	Kid_2	2
Year_86	1986	Kid_3	3 +
Year_87	1987	***Family Type***[b]	
Year_88	1988	FT_NFP	Non-family person
Year_89	1989	FT_LPF	Lone-parent families
Year_90	1990	FT_OIF	Husband-wife families with one
Year_91	1991	FT_TIF	Husband-wife families with two
Year_92	1992	***Female*Marital Status***	
Year_93	1993	S*MS_Sin	Single*Female
Age Groups		S*MS_Ma	Married (or Common Law)*Female
Age01	15-19	S*MS_W	Widowed*Female
Age02	20-24	S*MS_Sep	Separated*Female
Age03	25-29	S*MS_D	Divorced*Female
Age04	30-34	S*MS_X	Unidentified [a]*Female
Age05	35-39	***Female*Number of Children***	
Age06	40-44	S*Kid_0	Zero*Female
Age07	45-49	S*Kid_1	One*Female
Age08	50-54	S*Kid_2	Two*Female
Age09	55-59	S*Kid_3	More than 3*Female
Age10	60-64	***Female*Family Type***[b]	
Marital Status		S*F_NFP	Non-family person*Female
MS_Sin	Single	S*F_LPF	Lone-parent families*Female
MS_Ma	Married (or Common Law)	S*F_OIF	Husband-wife families with one
MS_W	Widowed	S*F_TIF	Husband-wife families with two
MS_Sep	Separated	***Sex***	
MS_D	Divorced	Sex_M	Male
MS_X	Unidentified [a]	Sex_F	Female

a This category regroups individuals who did not report their marital status on the T1 form.
b The classification of families was made on the basis of the taxfiler's and/or his/her spouse's income.

APPENDIX D

Estimated Exit and Re-Entry Hazard Rates, Single Spells, Without Unobserved Heterogeneity

Variables	Total Family Income				Private Family Income			
	Exit		Re-Entry		Exit		Re-Entry	
	Estimates	Standard Error	Estimates	Standard Error	Estimates	Standard Error	Estimates	Standard Error
AGE01	0.442	0.549	0.347	1.163	-0.011	0.517	1.033	0.924
AGE02	-0.024	0.085	-0.001	0.179	-0.191	0.075*	-0.330	0.168*
AGE03	-0.070	0.046	0.147	0.065*	-0.110	0.042*	0.157	0.058*
AGE04	-0.037	0.038	0.062	0.049	-0.091	0.035	0.172	0.044*
AGE06	0.096	0.040*	-0.103	0.050*	0.063	0.037	-0.011	0.045
AGE07	0.080	0.044	-0.100	0.055	0.038	0.040	-0.059	0.049
AGE08	-0.030	0.046	0.055	0.058	-0.090	0.043	0.077	0.053
AGE09	-0.084	0.047	0.054	0.060	-0.233	0.043*	0.166	0.054*
AGE10	-0.069	0.047	-0.080	0.062	-0.638	0.042*	0.414	0.053*
DUR_01	0.455	0.068*	-2.202	0.100*	0.808	0.061*	-2.111	0.084*
DUR_02	-0.137	0.074	-2.812	0.107*	0.141	0.066*	-2.626	0.091*
DUR_03	-0.430	0.078*	-3.161	0.110*	-0.268	0.070*	-3.003	0.094*
DUR_04	-0.666	0.085*	-3.393	0.114*	-0.457	0.076*	-3.268	0.098*
DUR_05	-0.819	0.095*	-3.576	0.119*	-0.714	0.086*	-3.462	0.102*
DUR_06	-0.840	0.107*	-3.695	0.127*	-0.859	0.098*	-3.568	0.108*
DUR_07	-0.960	0.126*	-3.777	0.137*	-0.721	0.109*	-3.763	0.120*
DUR_08	-0.760	0.144*	-3.745	0.157*	-0.804	0.131*	-3.621	0.134*
DUR_09	-0.946	0.190*	-3.898	0.222*	-1.040	0.172*	-3.808	0.183*
DUR_10	-1.259	0.294*	.	.	-1.136	0.236*	.	.
FT_LPF	-1.642	0.124*	1.640	0.162*	-1.282	0.108*	1.224	0.138*
FT_NFP	-1.581	0.100*	1.513	0.132*	-1.199	0.082*	1.159	0.104*
FT_OIF	-0.952	0.044*	1.053	0.057*	-0.947	0.038*	0.920	0.048*
KID_1	0.450	0.058*	-0.401	0.075*	0.288	0.052*	-0.238	0.065*
KID_2	0.264	0.055*	-0.266	0.070*	0.042	0.049	-0.168	0.061*
KID_3	0.018	0.057	0.104	0.072	-0.155	0.053*	0.105	0.066
MS_D	0.548	0.103*	-0.548	0.135*	0.149	0.086	-0.167	0.110
MS_SEP	0.704	0.109*	-0.444	0.142*	0.248	0.091*	-0.024	0.116
MS_SIN	0.619	0.096*	-0.536	0.129*	0.264	0.078*	-0.304	0.103*
MS_W	0.643	0.158*	-0.385	0.199	0.129	0.137	0.101	0.167
MS_X	-0.540	0.098*	0.659	0.124*	-0.527	0.100*	0.406	0.131*
SEX_F	0.118	0.071	-0.193	0.092*	-0.118	0.061	0.055	0.075
SF_LPF	-1.224	0.149*	0.536	0.197*	-1.159	0.128*	0.573	0.168*
SF_NFP	-0.962	0.134*	0.423	0.178*	-0.688	0.110*	0.209	0.144
SF_OIF	0.026	0.060	0.057	0.080	-0.123	0.052*	0.175	0.066*
SK_1	-0.135	0.077	0.171	0.100	0.122	0.067	-0.147	0.086
SK_2	-0.077	0.072	0.089	0.093	0.253	0.063*	-0.139	0.079
SK_3	-0.037	0.075	-0.007	0.095	0.262	0.068*	-0.223	0.084*
SM_D	0.696	0.130*	-0.067	0.175	0.682	0.109*	-0.293	0.144*
SM_SEP	0.423	0.137*	0.276	0.182	0.380	0.115*	-0.008	0.152
SM_SIN	0.548	0.127*	-0.279	0.173	0.563	0.105*	-0.186	0.141
SM_W	0.735	0.182*	-0.399	0.235	0.570	0.157*	-0.452	0.199*
SM_X	0.573	0.115*	-0.795	0.149*	0.478	0.113*	-0.589	0.150*
YEAR_85	0.161	0.049*	.	.	0.029	0.045	.	.
YEAR_86	0.519	0.049*	-0.211	0.087*	0.258	0.044*	-0.140	0.073
YEAR_87	0.460	0.051*	0.151	0.080	0.225	0.045*	0.024	0.069
YEAR_88	0.477	0.050*	-0.024	0.082	0.290	0.045*	-0.157	0.070*
YEAR_89	0.419	0.052*	0.152	0.080	0.220	0.047*	0.035	0.068
YEAR_90	0.416	0.052*	0.090	0.081	0.140	0.047*	0.053	0.069
YEAR_91	0.374	0.052*	0.235	0.080*	0.045	0.047	0.285	0.068*
YEAR_92	0.246	0.052*	0.236	0.080*	0.067	0.046	0.209	0.069*
YEAR_93	0.328	0.053*	0.191	0.081*	0.085	0.047	0.158	0.069*

* Indicates that the variables is significant at the 95 per cent interval level

APPENDIX E

Estimated Exit and Re-Entry Hazard Rates, Single Spells, With Unobserved Heterogeneity

Variables	Total Family Income				Private Family Income			
	Exit		Re-Entry		Exit		Re-Entry	
	Estimates	Standard Error	Estimates	Standard Error	Estimates	Standard Error	Estimates	Standard Error
AGE01	0.410	0.577	0.165	1.323	-0.086	0.552	1.037	1.056
AGE02	-0.037	0.090	0.049	0.201	-0.211	0.081*	-0.345	0.184*
AGE03	-0.081	0.049	0.152	0.075*	-0.118	0.045*	0.167	0.065*
AGE04	-0.039	0.040	0.072	0.054	-0.096	0.037*	0.194	0.048*
AGE06	0.103	0.042*	-0.109	0.055*	0.069	0.039	-0.014	0.049
AGE07	0.091	0.047	-0.121	0.062	0.048	0.043	-0.065	0.055
AGE08	-0.031	0.050	0.069	0.067	-0.090	0.046*	0.083	0.059
AGE09	-0.104	0.051*	0.085	0.070	-0.251	0.046*	0.205	0.061*
AGE10	-0.086	0.050	-0.072	0.071	-0.694	0.047*	0.502	0.061*
DUR_01	-0.277	0.207	-2.833	0.143*	0.519	0.123*	-2.679	0.127*
DUR_02	-0.805	0.218*	-3.326	0.148*	-0.066	0.128	-3.092	0.131*
DUR_03	-1.033	0.224*	-3.588	0.149*	-0.419	0.127*	-3.394	0.132*
DUR_04	-1.211	0.229*	-3.742	0.150*	-0.559	0.125*	-3.599	0.133*
DUR_05	-1.310	0.233*	-3.865	0.153*	-0.783	0.126*	-3.745	0.134*
DUR_06	-1.280	0.235*	-3.925	0.156*	-0.904	0.131*	-3.805	0.137*
DUR_07	-1.349	0.240*	-3.958	0.163*	-0.738	0.136*	-3.968	0.145*
DUR_08	-1.096	0.245*	-3.891	0.180*	-0.801	0.151*	-3.793	0.156*
DUR_09	-1.241	0.270*	-4.013	0.241*	-1.022	0.186*	-3.954	0.201*
DUR_10	-1.517	0.350*	.	.	-1.104	0.247*	.	.
FT_LPF	-1.754	0.134*	1.845	0.182*	-1.362	0.115*	1.340	0.153*
FT_NFP	-1.682	0.108*	1.730	0.147*	-1.275	0.088*	1.307	0.115*
FT_OIF	-1.030	0.049*	1.205	0.066*	-1.009	0.043*	1.047	0.054*
KID_1	0.484	0.062*	-0.484	0.086*	0.306	0.055*	-0.256	0.072*
KID_2	0.287	0.059*	-0.306	0.082*	0.041	0.053	-0.175	0.070*
KID_3	0.023	0.062	0.155	0.085	-0.176	0.057*	0.128	0.075
MS_D	0.570	0.110*	-0.624	0.152*	0.154	0.091	-0.156	0.121
MS_SEP	0.752	0.117*	-0.521	0.159*	0.272	0.096*	-0.022	0.127
MS_SIN	0.636	0.103*	-0.591	0.144*	0.270	0.083*	-0.325	0.113*
MS_W	0.674	0.169*	-0.435	0.230	0.138	0.147	0.157	0.189
MS_X	-0.585	0.103*	0.742	0.140*	-0.566	0.106*	0.459	0.145*
SEX_F	0.131	0.077	-0.208	0.103*	-0.134	0.065*	0.078	0.084
S*FT_LPF	-1.300	0.159*	0.698	0.219*	-1.229	0.136*	0.727	0.186*
S*FT_NFP	-1.005	0.142*	0.507	0.197*	-0.729	0.117*	0.263	0.157
S*FT_OIF	0.031	0.065	0.054	0.088	-0.128	0.055*	0.197	0.073*
S*KID_1	-0.134	0.083	0.176	0.134	0.138	0.072	-0.196	0.096*
S*KID_2	-0.076	0.078	0.060	0.107	0.276	0.068*	-0.185	0.090*
S*KID_3	-0.041	0.081	-0.025	0.112	0.286	0.073*	-0.268	0.097*
S*MS_D	0.693	0.139*	-0.056	0.194	0.700	0.116*	-0.338	0.159*
S*MS_SEP	0.406	0.146*	0.367	0.202	0.372	0.122*	0.005	0.167
S*MS_SIN	0.558	0.135*	-0.336	0.192	0.581	0.111*	-0.223	0.155
S*MS_W	0.754	0.194*	-0.478	0.270	0.588	0.167*	-0.553	0.224*
S*MS_X	0.598	0.122*	-0.874	0.169*	0.502	0.120*	-0.675	0.167*
YEAR_85	0.157	0.050*	.	.	0.025	0.046	.	.
YEAR_86	0.522	0.050*	-0.240	0.094*	0.255	0.046*	-0.168	0.078*
YEAR_87	0.457	0.053*	0.117	0.087	0.215	0.047*	-0.023	0.074
YEAR_88	0.472	0.052*	-0.100	0.089	0.277	0.047*	-0.233	0.076*
YEAR_89	0.408	0.054*	0.055	0.088	0.204	0.049*	-0.068	0.075
YEAR_90	0.405	0.054*	-0.039	0.090	0.119	0.049*	-0.072	0.076
YEAR_91	0.361	0.055*	0.078	0.089	0.018	0.050	0.150	0.075*
YEAR_92	0.225	0.054*	0.060	0.091	0.035	0.049	0.065	0.077
YEAR_93	0.308	0.055*	-0.002	0.093	0.052	0.050	-0.002	0.078
P_1	0.226	0.108	0.773	0.052	0.625	0.144	0.769	0.055
P_2	0.774	0.108	0.227	0.052	0.375	0.144	0.231	0.055
θ_2	1.019	0.131*	1.698	0.098*	0.981	0.138*	1.520	0.097*

* Indicates that the variables is significant at the 95 per cent interval level

APPENDIX F

Estimated Exit and Re-Entry Rates, Multiple Spells With Unobserved Heterogeneity

Variables	Total Family Income				Private Family Income			
	Exit		Re-Entry		Exit		Re-Entry	
	Estimates	Standard Error	Estimates	Standard Error	Estimates	Standard Error	Estimates	Standard Error
AGE1	0.497	0.656	0.035	1.381	-0.245	0.587	1.321	1.073
AGE2	-0.031	0.096	0.023	0.213	-0.236	0.086*	-0.292	0.192
AGE3	-0.086	0.053	0.088	0.080	-0.145	0.048*	0.171	0.069*
AGE4	-0.037	0.042	0.048	0.057	-0.105	0.039*	0.200	0.050*
AGE6	0.132	0.044*	-0.128	0.057*	0.086	0.041*	-0.018	0.051
AGE7	0.113	0.050*	-0.174	0.065*	0.063	0.047	-0.086	0.058
AGE8	-0.010	0.054	0.054	0.071	-0.086	0.050	0.106	0.063
AGE9	-0.106	0.055	0.130	0.075	-0.282	0.050*	0.303	0.066*
AGE10	-0.071	0.055	0.004	0.077	-0.806	0.050*	0.728	0.067*
DUR_1	-0.366	0.087*	-3.135	0.127*	0.119	0.075	-3.086	0.110*
DUR_2	-0.782	0.089*	-3.565	0.133*	-0.370	0.080*	-3.440	0.115*
DUR_3	-0.948	0.092*	-3.753	0.134*	-0.663	0.084*	-3.680	0.116*
DUR_4	-1.093	0.098*	-3.838	0.137*	-0.760	0.089*	-3.834	0.119*
DUR_5	-1.190	0.107*	-3.903	0.142*	-0.949	0.098*	-3.927	0.123*
DUR_6	-1.172	0.119*	-3.885	0.149*	-1.060	0.109*	-3.930	0.128*
DUR_7	-1.260	0.137*	-3.839	0.158*	-0.879	0.121*	-4.043	0.138*
DUR_8	-1.016	0.155*	-3.689	0.177*	-0.918	0.141*	-3.807	0.151*
DUR_9	-1.184	0.200*	-3.746	0.241*	-1.129	0.182*	-3.911	0.200*
DUR_10	-1.464	0.303*	.	.	-1.200	0.246*		
FT_OIF	-1.096	0.050*	1.309	0.067*	-1.116	0.044*	1.181	0.056*
FT_LPF	-1.867	0.140*	1.981	0.187*	-1.458	0.122*	1.476	0.160*
FT_NFP	-1.795	0.112*	1.886	0.152*	-1.400	0.093*	1.435	0.120*
KID_1	0.557	0.067*	-0.575	0.090*	0.330	0.059*	-0.296	0.076*
KID_2	0.355	0.064*	-0.395	0.087*	0.049	0.057	-0.206	0.074*
KID_3	0.074	0.068	0.070	0.091	-0.181	0.063*	0.137	0.081
MS_SEP	0.819	0.122*	-0.659	0.165*	0.324	0.103*	-0.070	0.133
MS_SIN	0.697	0.108*	-0.616	0.149*	0.304	0.089*	-0.314	0.118*
MS_W	0.745	0.183*	-0.482	0.246*	0.131	0.159	0.175	0.201
MS_D	0.665	0.115*	-0.712	0.158*	0.174	0.098	-0.146	0.128
MS_X	-0.644	0.111*	0.824	0.149*	-0.583	0.113*	0.477	0.153*
SEX_F	0.120	0.081	-0.230	0.108*	-0.166	0.070*	0.142	0.088
S*FT_OIF	0.048	0.067	0.026	0.090	-0.143	0.059*	0.206	0.076*
S*FT_LPF	-1.438	0.165*	0.898	0.226*	-1.408	0.144*	0.895	0.194*
S*FT_NFP	-1.053	0.147*	0.648	0.203*	-0.819	0.124*	0.404	0.164*
S*KID_1	-0.100	0.088	0.166	0.119	0.197	0.077*	-0.275	0.101*
S*KID_2	-0.042	0.083	0.079	0.114	0.339	0.074*	-0.259	0.096*
S*KID_3	-0.030	0.088	0.001	0.120	0.335	0.080*	-0.339	0.105*
S*MS_SEP	0.329	0.151*	0.520	0.209*	0.321	0.130*	0.046	0.174
S*MS_SIN	0.543	0.140*	-0.362	0.198	0.572	0.119*	-0.270	0.162
S*MS_W	0.781	0.209*	-0.583	0.287*	0.641	0.181*	-0.621	0.237*
S*MS_D	0.647	0.144*	0.012	0.201	0.717	0.124*	-0.355	0.167*
S*MS_X	0.649	0.133*	-0.972	0.180*	0.497	0.128*	-0.652	0.177*
YEAR_85	0.141	0.053*	.	.	0.018	0.048		
YEAR_86	0.563	0.053*	-0.310	0.097*	0.291	0.048*	-0.230	0.081*
YEAR_87	0.530	0.056*	-0.021	0.090	0.275	0.050*	-0.132	0.077
YEAR_88	0.591	0.055*	-0.284	0.092*	0.386	0.050*	-0.377	0.079*
YEAR_89	0.567	0.057*	-0.161	0.091	0.340	0.052*	-0.242	0.078*
YEAR_90	0.607	0.058*	-0.304	0.093*	0.282	0.052*	-0.285	0.079*
YEAR_91	0.577	0.058*	-0.224	0.093*	0.193	0.053*	-0.085	0.079
YEAR_92	0.446	0.058*	-0.290	0.095*	0.217	0.052*	-0.193	0.081*
YEAR_93	0.548	0.059*	-0.376	0.098*	0.233	0.053*	-0.275	0.082*
THETA	1.477	0.059*	2.077	0.065*	1.513	0.051*	1.901	0.059*
R1	0.000	0.000	.	.	0.000	0.000		
R2	0.401	0.021*	.	.	0.424	0.021*		
R3	0.595	0.021*	.	.	0.576	0.021*		
R4	0.004	0.010	.	.	0.000	0.000		

* Indicates that the variables is significant at the 95 per cent interval level

APPENDIX G

Expected Years in Low Income by Age, Sex, Marital Status, Family Type and Number of Children, by Income Measure

Socio-Demographic Characteristics		Tlims		Plims	
		Mean years below the LIMs over next ten years	% below the LIMs more than five of the next ten years	Mean years below the LIMs over next ten years	% below the LIMs more than five of the next ten years
Starting Age=25					
Male					
1) Lone Parent, Divorced with	1 child	3.826	26.86%	4.381	34.47%
	2 children	4.222	32.01%	4.851	40.29%
	3+ children	4.946	41.35%	5.459	47.97%
2) Lone Parent, Single with	1 child	3.852	27.28%	4.074	30.49%
	2 children	4.245	32.41%	4.533	36.29%
	3+ children	4.970	41.71%	5.133	43.86%
3) Lone Parent, Separated with	1 child	3.669	24.86%	4.242	32.75%
	2 children	4.052	29.96%	4.694	38.44%
	3+ children	4.768	39.21%	5.296	45.98%
4) Non-Family Person	Divorced	4.833	39.81%	4.965	41.80%
	Separated	4.650	37.64%	4.813	39.99%
	Single	4.854	40.16%	4.647	37.81%
	Widow	4.882	40.61%	5.284	45.86%
5) Married, Two Income with	0 children	2.650	11.25%	2.514	9.92%
	1 child	1.955	3.51%	2.097	5.12%
	2 children	2.159	5.52%	2.354	8.22%
	3+ children	2.621	10.74%	2.772	13.24%
6) Married, One Income with	0 children	4.879	40.50%	4.723	38.78%
	1 child	3.719	25.51%	4.038	30.04%
	2 children	4.106	30.62%	4.493	35.81%
	3+ children	4.825	39.89%	5.091	43.36%
Female					
1) Lone Parent, Divorced with	1 child	5.520	48.63%	5.670	50.58%
	2 children	5.810	52.41%	5.972	54.46%
	3+ children	6.517	62.10%	6.551	62.11%
2) Lone Parent, Single with	1 child	5.442	47.45%	5.632	50.05%
	2 children	5.736	51.27%	5.935	53.92%
	3+ children	6.437	60.71%	6.513	61.53%
3) Lone Parent, Separated with	1 child	6.189	57.76%	6.430	60.67%
	2 children	6.483	61.87%	6.735	64.80%
	3+ children	7.191	72.40%	7.305	72.77%
4) Non-Family Person	Divorced	5.565	49.25%	5.513	48.65%
	Separated	6.239	58.50%	6.273	58.64%
	Single	5.484	48.04%	5.473	48.10%
	Widow	4.984	41.73%	5.740	51.52%
5) Married, Two Income with	0 children	2.421	8.53%	2.760	13.06%
	1 child	1.920	3.24%	2.014	4.44%
	2 children	2.044	4.43%	2.158	5.95%
	3+ children	2.418	8.39%	2.489	9.71%
6) Married, One Income with	0 children	4.496	35.63%	5.447	47.85%
	1 child	3.609	24.04%	4.245	32.72%
	2 children	3.854	27.30%	4.520	36.20%
	3+ children	4.486	35.59%	5.060	42.99%

APPENDIX G (Continued)

Socio-Demographic Characteristics		Tlims		Plims	
		Mean years below the LIMs over next ten years	% below the LIMs more than five of the next ten years	Mean years below the LIMs over next ten years	% below the LIMs more than five of the next ten years
Starting Age=45					
Male					
1) Lone Parent, Divorced with	1 child	3.570	23.73%	4.052	30.39%
	2 children	3.954	28.79%	4.507	36.10%
	3+ children	4.671	38.08%	5.109	43.67%
2) Lone Parent, Single with	1 child	3.599	24.17%	3.750	26.43%
	2 children	3.981	29.24%	4.194	32.12%
	3+ children	4.698	38.50%	4.787	39.65%
3) Lone Parent, Separated with	1 child	3.425	21.81%	3.923	28.75%
	2 children	3.796	26.84%	4.360	34.36%
	3+ children	4.502	36.09%	4.955	41.86%
4) Non-Family Person	Divorced	4.554	36.48%	4.625	37.68%
	Separated	4.381	34.46%	4.483	36.00%
	Single	4.579	36.89%	4.311	33.70%
	Widow	4.612	37.44%	4.947	41.80%
5) Married, Two Income with	0 children	2.451	9.03%	2.285	7.43%
	1 child	1.822	2.54%	1.919	3.59%
	2 children	2.004	4.14%	2.139	6.05%
	3+ children	2.428	8.59%	2.517	10.26%
6) Married, One Income with	0 children	4.604	37.25%	4.386	34.68%
	1 child	3.471	22.44%	3.718	26.00%
	2 children	3.846	27.47%	4.156	31.67%
	3+ children	4.556	36.73%	4.748	39.19%
Female					
1) Lone Parent, Divorced with	1 child	5.232	45.07%	5.312	46.12%
	2 children	5.518	48.69%	5.610	49.85%
	3+ children	6.225	58.11%	6.187	57.28%
2) Lone Parent, Single with	1 child	5.145	43.76%	5.271	45.56%
	2 children	5.435	47.43%	5.570	49.30%
	3+ children	6.137	56.69%	6.147	56.70%
2) Lone Parent, Separated with	1 child	5.906	53.95%	6.071	55.91%
	2 children	6.198	57.92%	6.376	59.92%
	3+ children	6.921	68.41%	6.959	67.88%
3) Non-Family Person	Divorced	5.279	45.70%	5.162	44.33%
	Separated	5.958	54.67%	5.919	53.98%
	Single	5.189	44.36%	5.119	43.74%
	Widow	4.702	38.35%	5.384	47.07%
4) Married, Two Income with	0 children	2.239	6.66%	2.506	10.11%
	1 child	1.791	2.33%	1.845	3.08%
	2 children	1.899	3.26%	1.969	4.24%
	3+ children	2.239	6.54%	2.261	7.27%
5) Married, One Income with	0 children	4.227	32.44%	5.100	43.61%
	1 child	3.365	21.00%	3.918	28.64%
	2 children	3.601	24.19%	4.186	32.10%
	3+ children	4.222	32.45%	4.718	38.84%

BIBLIOGRAPHY

Baker, Michael and Samuel A. Rea Jr. (1993), Employment Spells and Unemployment Insurance Eligibility Requirements, ***Mimeo***, University of Toronto.

Bane, Mary Jo and David T. Ellwood (1986), Slipping Into and Out of Poverty: The Dynamics of Spells, ***Journal of Human Resources***, vol. 21(1), pp. 1-23.

Barrett, Garry F. and Michael I. Cragg (1995), Dynamics of Canadian Welfare Participation, ***UBC Discussion Paper No. 95-08***, 35 pages.

Beach, Charles M. and George A. Slotsve (1996), ***Are We Becoming Two Societies? Income Polarization and the Myth of the Declining Middle Class in Canada***, C.D. Howe Institute, Toronto.

Blank, Rebecca M. (1989), Analyzing the Length of Welfare Spells, ***Journal of Public Economics***, vol. 39(3), pp. 245-273.

Clark, C. (1997), ***An Introduction to the Longitudinal Administrative Databank (LAD)***, Ottawa: Small Area and Administrative Data Division, Statistics Canada.

Coe, Richard D. (1978), Dependency and Poverty in the Short and Long Run, in Duncan, Greg J. and James N. Morgan (edited by), ***Five Thousand American Families: Patterns of Economic Progress***, Vol. 6, Ann Arbor, Michigan: Institute for Social Research.

Crompton, Susan (1996), Paiements de transfert aux familles avec enfants, ***L'emploi et le revenu en perspective***, vol. 8(3), Cat. 75-001, p. 46-52.

Dooley, Martin D. (1994), Women, Children and Poverty in Canada, ***Canadian Public Policy***, vol. 20(4), pp. 430-443.

Duclos, J.-Y., B. Fortin, G. Lacroix and H. Roberge (1996), La dynamique de la participation à l'aide sociale du Québec: 1979-1993, Report prepared for the Ministère de la Sécurité du Revenu du Québec.

Duncan, Greg J, Richard. D. Coe, Mary E. Corcoran, Martha S. Hill, Saul D. Hoffman and James N. Morgan (1984), ***Years of Poverty Years of Plenty: The Changing Economic Fortunes of American Workers and Families***, Ann Arbor. Michigan: Institute for Social Research.

Duncan, Greg J. and Willard Rodgers (1991), Has Children's Poverty Become More Persistent?, ***American Sociological Review***, vol. 56(4), pp. 538-549.

Economic Council of Canada (1992), ***The New Face of Poverty: Income Security Needs of Canadian Families***, Ottawa.

Fortin, Bernard, Guy Lacroix and Jean-François Thibault (1996), Assurance-chômage et dynamique des séjours à l'aide sociale, 32 pages, mimeo.

Gottschalk, Peter and Robert A. Moffit (1994), Welfare Dependence: Concepts, Measures and Trends, ***American Economic Review***, vol. 84(2), pp. 38-42.

Gottschalk, Peter (1982), Earning Mobility: Permanent Change or Transitory Fluctuations?, ***The Review of Economics and Statistics***, vol. 64(3), pp. 450-456.

Gunderson, Morley and Angelo Melino (1990), The Effects of Public Policy on Strike Duration, ***Journal of Labor Economics***, vol. 8(3), pp. 295-316.

Ham, J. C. and Samuel A. Rae Jr. (1987), Unemployment Insurance and Male Unemployment in Canada, ***Journal of Labor Economics***, vol. 5(3), pp. 325-353.

Hanratty, Maria J. and Rebecca M. Blank (1992), Down and Out in North America: Recent Trends in Poverty Rates in the United States and Canada, ***Quarterly Journal of Economics***, vol. 107(1), pp. 233-254.

Health, Julia A. and B. F. Kiker (1992), Determinants of Spells of Poverty Following Divorce, ***Review of Social Economy***, vol. 50(3), pp. 305-315.

Heckman, J. and B. Singer (1984), A Method for Minimizing the Impact of Distributional Assumptions in Econometric Models for Duration Data, ***Econometrica***, vol. 52(2), pp. 325-353.

Hoynes, Hilary and Thomas MaCurdy (1994), Has the Decline in Benefits Shortened Welfare Spells, ***American Economic Review***, vol. 84(2), pp. 43-48.

Jarvis, Sarah and Stephen P. Jenkins (1997), Low Income Dynamics in 1990s Britain, ***Fiscal Studies***, vol. 18(2), pp. 123-142.

Kiefer, Nicholas M. (1988), Economic Duration Data and Hazard Functions, ***Journal of Economic Literature***, vol. 26(2), pp. 646-679.

Lacroix, Guy (1997), Reforming the Welfare System: In Search of the Optimal Policy Mix, Paper presented at the IRPP Conference held in Montréal, April 18-19, 1997.

Laroche, Mireille and G. C. Ruggeri (1996), The Duration of Low Income Spells in Canada, 1982-1993, Department of Finance, Canada, Economic Studies and Policy Analysis Division, mimeo.

Lillard, Lee A. and Robert J. Willis (1978), Dynamic Aspects of Earnings Mobility, ***Econometrica***, vol. 46(5), pp. 985-1012.

Meyer, Bruce D. (1990), Unemployment Insurance and Unemployment Spells, ***Econometrica***, vol. 58(4), pp. 757-782.

Moffitt, Robert A. and Michael Rendall (1993), Cohort Trends in the Lifetime Distribution of Female Headship in the U.S., 1968-1985, ***Brown University Population Studies and Training Center Working Paper 93-90.***

Morissette, René and Charles Bérubé (1996), Longitudinal Aspects of Earnings Inequality in Canada, ***Statistics Canada Research Paper Series No. 94***, 43 pages.

National Council of Welfare (1987), ***Welfare in Canada: The Tangled Safety Net***, Health and Welfare Canada, Ottawa.

Nickell, Stephen (1979), Estimating the Probability of Leaving Unemployment, ***Econometrica***, vol. 47(5), pp. 1249-1266.

Phipps, Shelley (1995), Canadian Child Benefits: Behavioural Consequences and Income Adequacy, ***Canadian Public Policy***, vol. 21(1), pp. 20-30.

Phipps, Shelley A. (1995), Taking Care of Our Children: Tax and Transfer Options for Canada, in ***Family Matters: New Policies for Divorce, Lone Mothers, and Child Poverty***, C.D. Howe Institute, Toronto.

Phipps, Shelley and P. Burton (1993), Collective Models of Family Behavior: Implication for Economic Policy, paper presented at the Status of Women Workshop on Economic Inequality, Ottawa, Nov. 29-30.

Picot, Garnett and John Myles (1996), Social Transfers, Changing Family Structure and Low Income Among Children, ***Canadian Public Policy***, vol. 22(3), pp. 244-267.

Sharif, Najma and Shelley Phipps (1994), The Challenge of Child Poverty: Which Policies Might Help?, ***Canadian Business Economics***, vol. 2(3), pp. 17-30.

Statistics Canada (1993), ***Family Income: Census Families 1993***, Cat. 13-208, Annual Publication.

Stevens, Ann Huff (1995), Climbing Out of Poverty, Falling Back in: Measuring the Persistence of Poverty Over Multiple Spells, ***NBER Working Papers No. 5390***, 64 pages.

Stevens, Ann Huff (1994), The Dynamics of Poverty Spells: Updating Bane and Ellwood, ***American Economic Review***, vol. 84(2), pp. 34-37.

Zyblock, Myles (1996), Child Poverty Trends in Canada: Exploring Depth and Incidence from a Total Money Income Perspective, 1975-1992, ***Human Resources Development Canada Working Paper W-96-1E.***

Department of Finance Working Papers

Working papers are published in the language of preparation, with an abstract in both official languages. Working papers listed below are available from:

Economic Studies and Policy Analysis Division
Department of Finance
140 O'Connor Street
18th Floor, East Tower
Ottawa, Ontario
K1A 0G5

or, through electronic mail, at:

workpapers.doctravail@fin.gc.ca

Unless otherwise indicated, the working papers listed below are available in English only.

1998

98-09 **"The BU Ratio: Prospect and Retrospect"**
Timothy C. Sargent

98-08 **"Youth and the 1990s Labour Market"**
Carolyn Wilkins

98-07 **"The Canadian Economic and Fiscal Model – 1996 Version: Part 3 – Empirical Specification and Statistical Assessment"**
Jian-Guo Cao and Benoît Robidoux

98-06 **"The Canadian Economic and Fiscal Model – 1996 Version: Part 2 – Dynamic Forecasting and Simulation Properties"**
Alain DeSerres, Benoît Robidoux and Bing-Sun Wong

98-05 **"The Canadian Economic and Fiscal Model – 1996 Version: Part 1 – Model Structure"**
Benoît Robidoux and Bing-Sun Wong

98-04 **"Population Ageing and the Current Account in Selected OECD Countries"**
Maxime Fougère and Marcel Mérette

98-03 **"Population Ageing and Economic Growth in Seven OECD Countries"**
Maxime Fougère and Marcel Mérette

98-02 **"The Persistence of Low Income Spells in Canada, 1982-1993"**
Mireille Laroche

98-01 **"On the Concept and Dimensions of Human Capital in a Knowledge-Based Economy Context"**
Mireille Laroche, Marcel Mérette and G.C. Ruggeri

1997

97-08 **"Estimating the Economic Efficiency Consequences of Alternative Tax Reforms Using a CGE Model: Homogeneous Vs Heterogeneous Labour Specifications"**
Louis Beauséjour, Mokhtar Souissi, Carole Vincent and G.C. Ruggeri

97-07 **"Tax Expenditures and Tax Preferences in the Personal Income Tax System of Selected OECD Countries: A Suggested Classification**
G.C. Ruggeri and Carole Vincent

97-06 **"Income Taxes, Life-Cycles and Growth"**
Marcel Mérette

97-05 **"Effective Income Tax Rates in Macroeconomics: An Update for Canada"**
G.C. Ruggeri, Mireille Laroche and Carole Vincent

97-04 **"A Public versus a Private Canada Pension Plan: A Survey of the Economics"**
Steven James

97-03 **"Forecasting Canadian Recessions with Macroeconomic Indicators"**
Robert Lamy

97-02 **"The Dynamic Effects of Taxes and Government Spending in a Calibrated Canadian Endogenous Growth Model"**
Jing Xu

97-01 **"The Impact of Fiscal Policy on the Risk Premium of Government Long-Term Debt: Some Canadian Evidence"**
Todd Mattina and François Delorme

1996

96-06 **"Does the Length of the Current Expansion Increase the Probability of Recession?"**
Lisa Backa

96-02 **"Do Mechanical Filters Provide a Good Approximation of Business Cycles?"**
Alain Guay and Pierre St-Amant

96-01 **"An Indicator Model of Core Inflation in Canada"**
Robert Lamy and Paul Rochon

1995

95-12 **"Potential Economic Effects of Experience-Rating the Unemployment Insurance System Using a Multi-Sector General Equilibrium Model of Canada"**
Louis Beauséjour, Munir A. Sheikh and Baxter Williams

95-11 **"Active Labour Market Policies: An Evaluation"**
Lori Marchildon

95-10 **"An Index of Unemployment Insurance Disincentives"**
Timothy C. Sargent

95-09 **"The Economics of Canada Pension Plan Reforms"**
Steven James, Chris Matier, Humam Sakhnini and Munir Sheikh

95-08 **"The Long-Run Economic Impacts of Government Debt Reduction"**
Steven James and Chris Matier

95-07 **"Time Series Properties of Canadian Real Interest Rates"**
Chris Matier and Werner Schüle

95-06 **"Interpreting Sacrifice Ratios Across Countries and Over Time"**
Brenda Lipsett and Steven James

95-05 **"Effective Rates of Assistance: An Old Idea Whose Time Has Come?"**
Louis Beauséjour and Munir A. Sheikh

95-04 **"Aggregate Fluctuations, Monetary Policy and Nominal Wage Rigidities in a New-Classical Setting: Results for Canada"**
Humam Sakhnini

95-03 **"Ricardian Equivalence and the Permanent Income Hypothesis: An Empirical Investigation"**
Benoit Perron

95-02 **"Are New-Classical Models Becoming Relevant Policy Tools: A Survey of Recent New-Classical Models"**
Humam Sakhnini

95-01 **"Fluctuations économiques dans un environnement de stabilité des prix"**
Claude Lavoie
Please note that this working paper is available in French only.

1994

94-06 **"Conditional Productivity Convergence in Canada"**
Frank C. Lee

94-05 **"A Guide to Applied Modern Macroeconometrics"**
Alain Paquet

94-04 **"Interindustry Wage Differentials: Evidence, Explanations and Potential Distortions"**
Mario Iacobacci

94-03 **"Regional Productivity Convergence in Canada"**
Frank C. Lee and Serge Coulombe

94-02 **"Regional Economic Disparities in Canada"**
Serge Coulombe and Frank C. Lee

94-01 **"The Interaction of Inflation with a Canadian-Type Capital Tax System: A Dynamic General Equilibrium Analysis Incorporating Endogenous Leverage and Heterogeneous Households"**
Steven James

1992

92-04 **"An Environmental CGE Model of Canada and the United States"**
Louis Beauséjour, Gordon Lenjosek and Michael Smart

92-03 **"Estimating Trend Total Factor Productivity Growth in Canada"**
Carolyn Wilkins, Frank Lee and Steven James

92-02 **"Un indice de prix régional de biens et services comparables au Canada et son application aux disparités régionales de revenu"**
Raynald Létourneau
Please note that this working paper is available in French only.

92-01 **"A New Composite Leading Indicator of the Canadian Economy"**
Robert Lamy

1990

90-07 **"Une analyse empirique des déterminants du taux d'intérêt réel mondial"**
Benoît Robidoux
Please note that this working paper is available in French only.

90-06 **"Real Interest Rates in Historical Perspective"**
Paul Jenkins

90-05 **"The Contribution of Fiscal Policy to Real Interest Rate Movements in the 1980s"**
Paul Jenkins

90-04 **"The Constant Price Hypothesis in Multi-Industry Cross-Section Studies: The Impact on Cost Function Estimates"**
Benoît Robidoux and John Lester

90-03 **"The Cyclically-Adjusted Output Methodology"**
Mario Albert, Nathalie Boisvert and Robert Fonberg

90-02 **"The Determination of Real Interest Rates"**
Joel Fried and David Burgess

90-01 **"La voie des dépenses fiscales : le point sur les questions conceptuelles et les controverses"**
Neil Bruce
Please note that this working paper is available in French only.

1989

89-07 **"INTERMOD 2.0: Model Specification and Simulation Properties"**
Guy Meredith

89-06 **"The Calculation of Marginal Effective Tax Rates in the 1987 White Paper on Tax Reform"**
Jack Jung

89-05 **"Effects of Changing Age Structure on Consumption and Saving"**
Paul Jenkins

89-04 **"Expectations, Policy Shocks, and Output Behaviour in a Multi-Country Macroeconomic Model"**
Guy Meredith

89-03 **"The Goods and Services Tax: A General Equilibrium Analysis"**
Bob Hamilton and Chun-Yan Kuo

89-02 **"A Survey of Some Recent Developments in Macroeconomics"**
Michael Devereux

89-01 **"Closed Economy Analysis of the Dynamics of Deficits and Debt in a Unitary and Federal State"**
Carolyn Wilkins and Mario Albert

1988

88-10 **"A Guide to the GET Model"**
Richard G. Harris

88-09 **"INTERMOD Model User's and Developer's Guide for PC Systems"**
Philip Bagnoli and Anders Kruus

88-08 **"The Trade Sector in INTERMOD"**
Guy Meredith

88-07 **"INTERMOD 1.1: A G-7 Version of the IMF's Multimod"**
John F. Helliwell, Guy Meredith, Yves Durand and Philip Bagnoli

88-06 **"Resolutions of the U.S. Trade Imbalances: How Painful Will the Adjust Be?"**
Janice Haritos

88-05 **"Econometric Estimates of Import Price Elasticities for Canada"**
Raynald Létourneau and John Lester

88-04 **"Econometric Estimates of Scale Economies in Canadian Manufacturing"**
Benoît Robidoux and John Lester

88-03 **"Trade Barriers Between Canada and the United States"**
John Lester and Tony Morehen

88-02 **"New Estimates of Canadian Tariff Rates by Industry and Commodity"**
John Lester and Tony Morehen

88-01 **"Geographic Labour Mobility in Canada"**
Louis Grignon and Kei Moray

1987

87-01 **"Économies d'échelle : Un survol des techniques d'estimation et des problèmes méthodologiques"**
Benoît Robidoux
Please note that this working paper is available in French only.

1986

86-01 **"The Structure of Production in Ten Canadian Industries"**
François Delorme and John Lester

G:\WorkingPaper\WPListE.doc